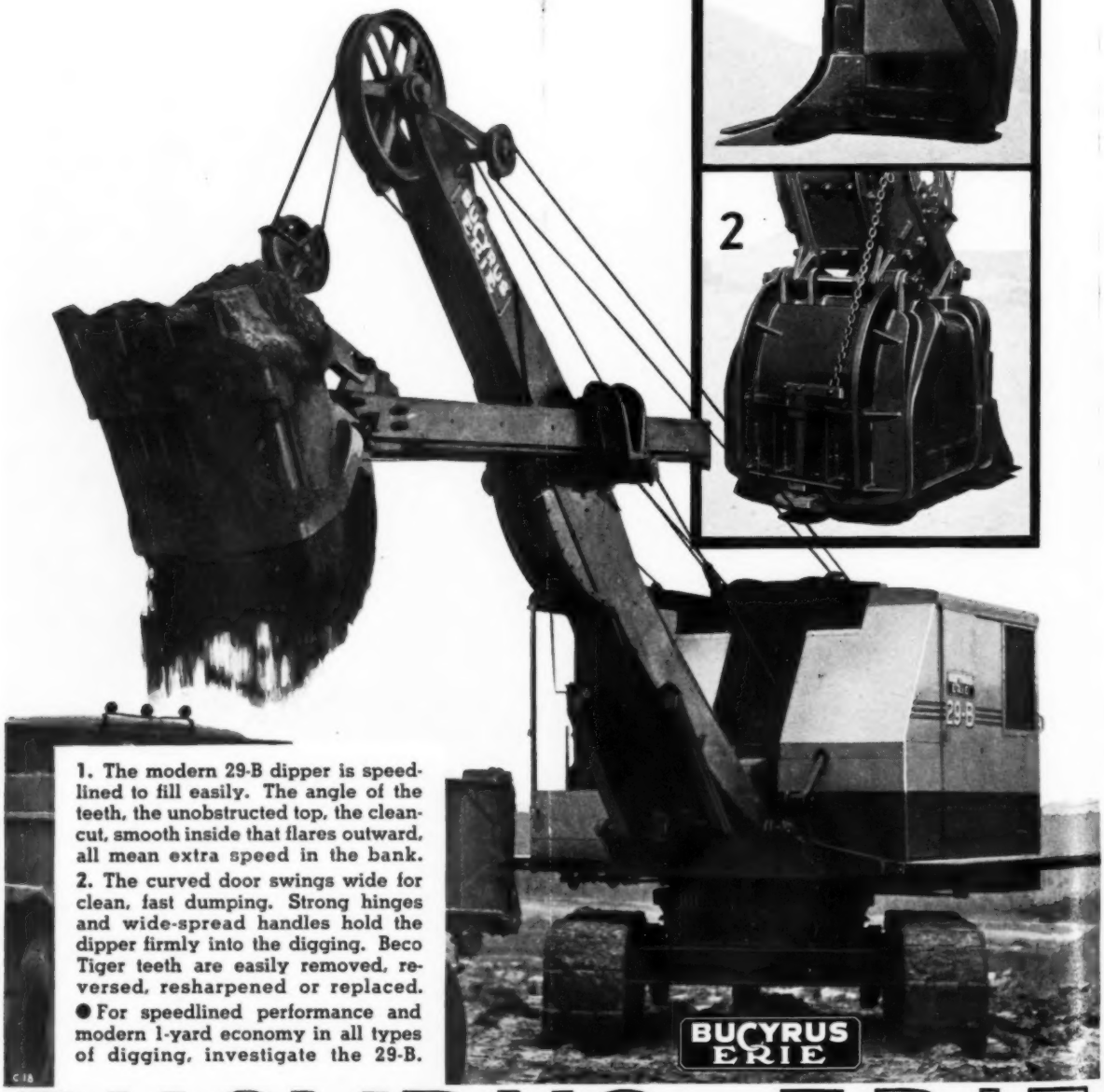
EXCAVATING ENGINEER

FOUNDED 1905

July 1938

Vol. XXXII Number 7

FILLS fast... DUMPS fast



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EXCAVATING ENGINEER

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Vol. XXXII **July, 1938** No. 7

Cut-Off ..... **Front Cover**

Granfield, Farrar and Carlin are constructing a cut-off that will eliminate 60 curves from the Altamont Pass highway. Nine LeTourneau scrapers, pulled by Caterpillar tractors are handling 1,875,000 yards of excavation. This unusual photograph is presented through the courtesy of the Caterpillar Tractor Company.

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LOOKING AHEAD

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Early Gold Dredging

Here's the story of the first days of mining placer gold with dredges in the Montana deposits.

Drilling For Coal

At United Electric Coal Companies' Fidelity Mine, 9-inch blast holes increase efficiency and improve fragmentation.

Indiana Highway

Calumet Paving Company finds weather chief problem on concrete highway construction job at Troy, Indiana. Despite rain, however, excavation is well ahead of schedule.

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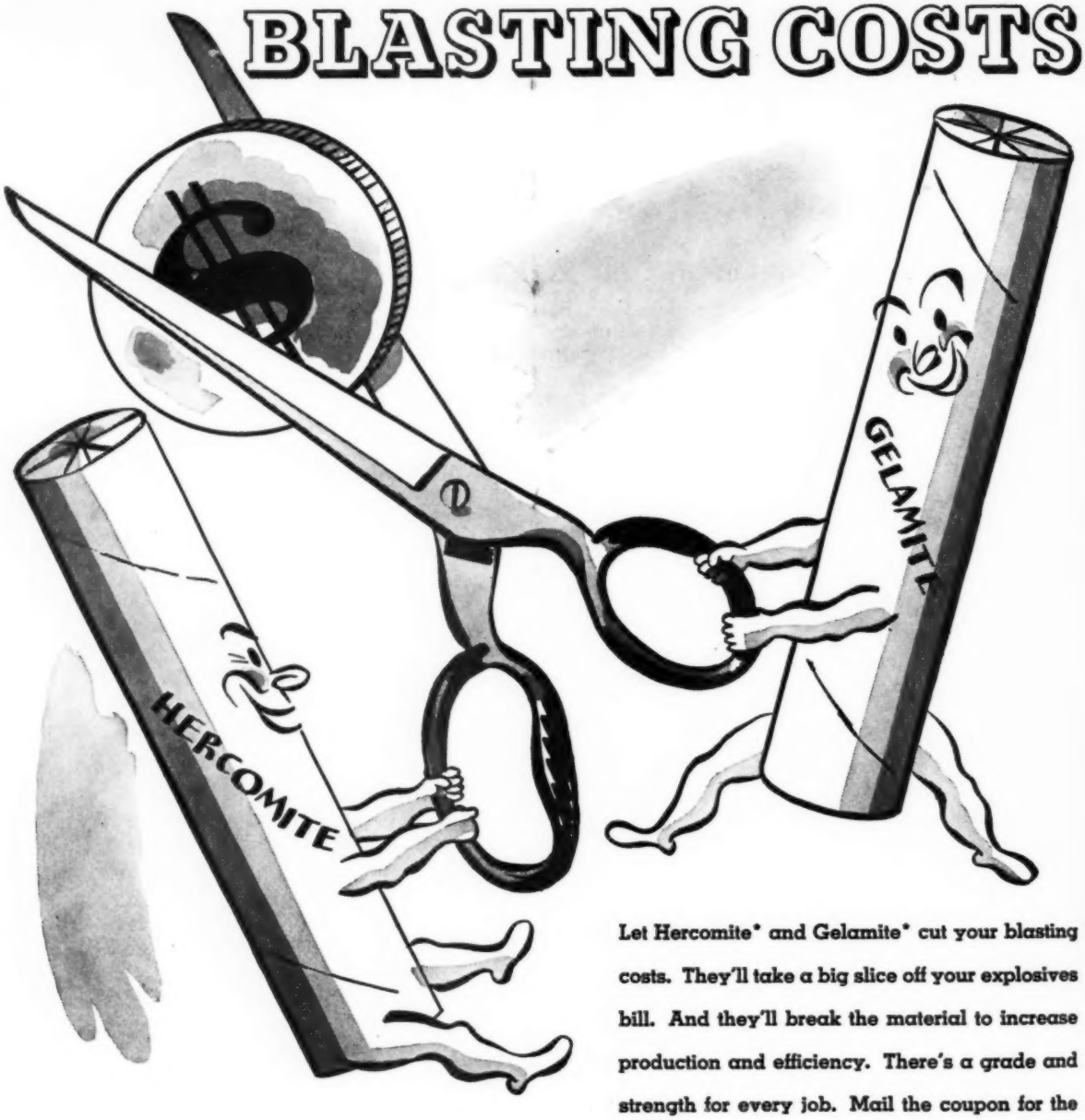

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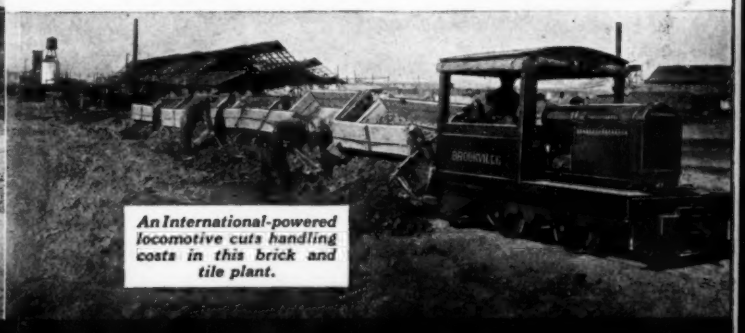
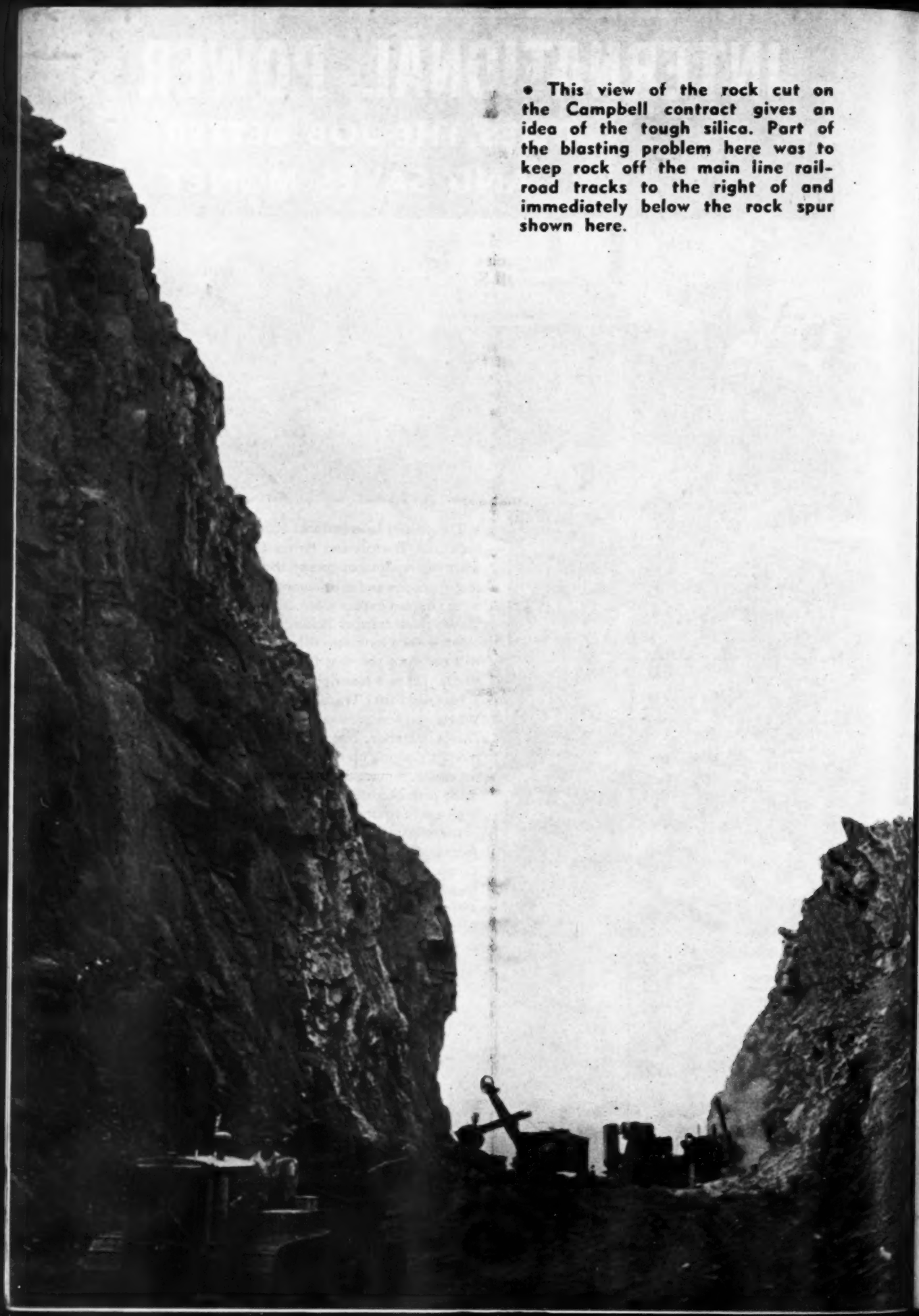


An International-powered locomotive cuts handling costs in this brick and tile plant.

INTERNATIONAL Industrial Power



• This view of the rock cut on the Campbell contract gives an idea of the tough silica. Part of the blasting problem here was to keep rock off the main line railroad tracks to the right of and immediately below the rock spur shown here.

Tough Going *in Rock!*

Hard digging and the keeping of blasted rock off main line railroad tracks were the two chief obstacles overcome on highway jobs of Harry T. Campbell Sons and Roberts Paving Company.

By SPENCER A. JONES

ON THE west bank of the Susquehanna River about 8 miles north of and across the river from Harrisburg, the capitol of Pennsylvania, sections 3 and 3A of State Route No. 30 are being constructed in Cumberland and Perry Counties and through the town of Marysville. The two sections together are only a total of 12,354 ft. long, but for difficulties of construction there are few stretches of similar length in the country which surpass them.

The new highway is being built for the Commonwealth of Pennsylvania, Department of Highways, and is within the jurisdiction of M. D. Jones, District Engineer of District 8 and Charles I. Barner, Resident Engineer of District 80.

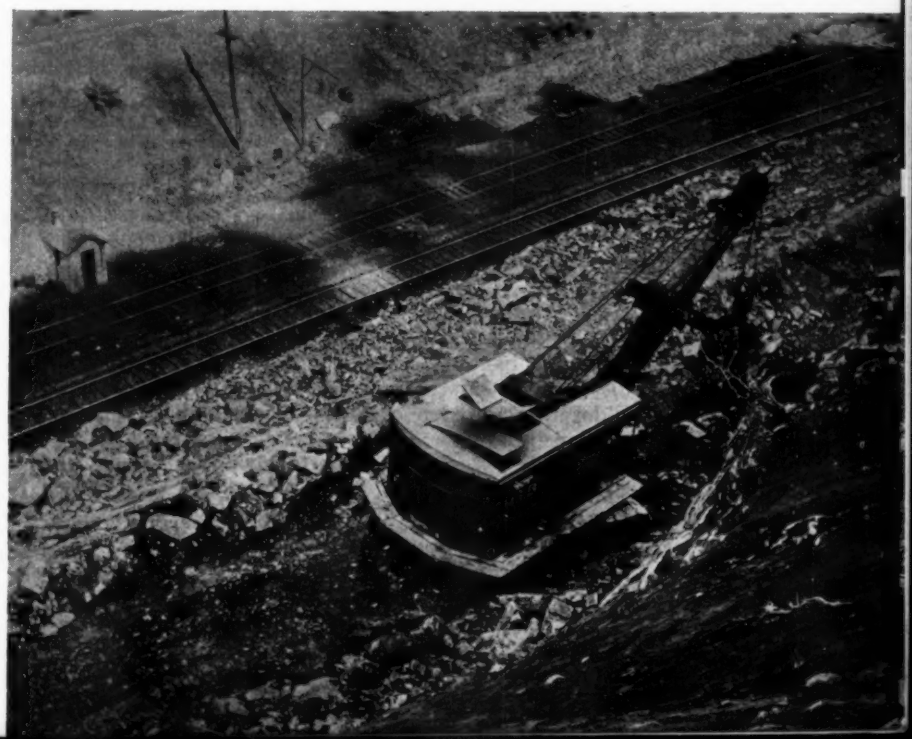
The contractor for Section 3, which has a length of 4,450 ft., is Harry T. Campbell Sons' Company, Towson, Maryland. This section, the more southerly of the two under construction, extends north from a point about two miles south of Marysville, where the present State Route No. 30 makes a sharp turn to the east to cross over the tracks of the Pennsylvania Railroad. From its starting point, instead of turning east as the old road does, it continues straight north up a gentle grade on a rock fill about 2,000 ft. long, slices off the side of a mountain for about 1,500 ft., and clings to a narrow ledge which is nearly a vertical 200 ft. above the Pennsylvania's heavily traveled freight tracks. Thence it runs another 1,000 ft. north through a deep earth sidehill cut to join Section 3A in the center of a fill beyond the earth cut.

The slice off the side of the mountain involves a cut considerably in excess of 300 ft. high on the west side and, almost 100 ft. high on the east side where the new road passes through a spur. The cut is an extremely difficult one—earth to the south, to be sure, that soon changed to rather easily dug shale as the shovel moved north. Then real rock digging, a tough granite that was hard to blast—particularly considering those railroad tracks lying down below there to the east. And then, as further northward progress was made, came the hardest rock of all—a strata of the hardest, toughest kind of silica you ever saw, standing up on an angle of about 70 degrees right across the right of way, like a wall defying further progress. And as if to testify to the toughness of that rock, there lay the Susquehanna River to the east beyond the tracks and across it, like some old abandoned, broken dam stretched this same seam; the rock both upstream and down eroded far below water level by the water action of ages. The volume removed from the rock cut is more than 150,000 cu. yds., all of which is being handled by a 43-B Bucyrus-Erie 2 yd. shovel.

The rock is blasted with American Cyanimid & Chemical Corporation's and E. I. du Pont de Nemours Company's 40% and 60% standard gelatine in sizes 1¾" x 16" and 1½" x 8". Three-inch blast holes are drilled with two Ingersoll-Rand wagon drills to a depth of from 6 to 20 ft., the deeper holes ending up 2" in diameter. Timken rock bits drill the holes at the rate of 10 to 20 ft. per hour, making 3 to 6 ft. of hole before requiring sharpening. The rock bits are shipped to Philadelphia, more than 100 miles away, for sharpening. Blast holes are spaced approximately 5 ft. apart and 5 ft. back from the face of the cliff.

Keeping the Main Line Clear

One difficulty encountered in the blasting is to prevent flying rocks from landing in too great numbers on the railroad tracks



• The 43-B digs its way back into the rock cut after a blast. Note the shadow of the cliff falling across the railroad tracks several hundred feet below.

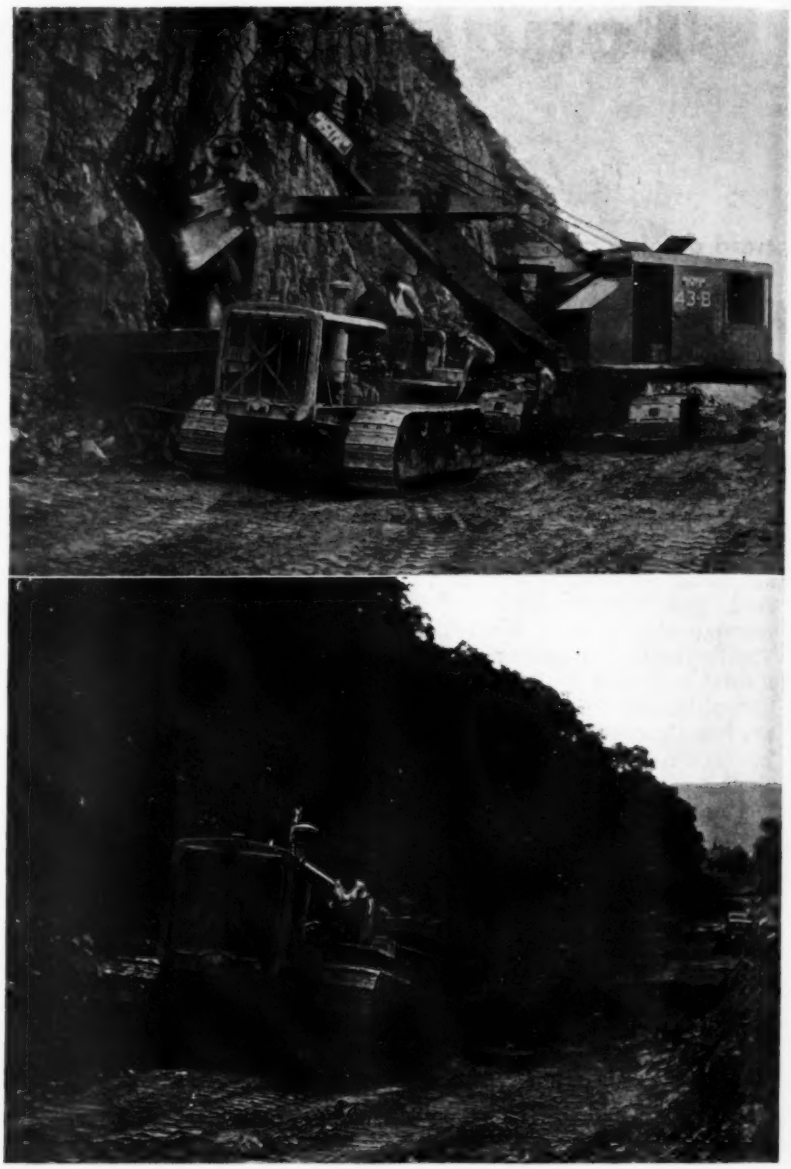
almost immediately below. Despite the utmost care, there have been one or two occasions when blast fragments had to be cleared away in a hurry to prevent delays to freight traffic. Blasting time is governed by railroad schedules. Usually only two shots per day are fired and these at times when tracks are due to be free of trains for quite a while. The drillers work 2 shifts a day.

The rock is quite well broken in the blasts, although two jackhammers are kept on the job for making little ones out of the chunks that are too big for the 43-B to handle. Perched on the side of the hill in a very businesslike little timber compressor house is a Gardner-Denver compressor, operated by a Caterpillar Diesel motor, which supplies air at 90 lbs. for the wagon drills and jackhammers. A 65 Caterpillar combination air compressor and tractor with a drifting drill attached to the front of its frame at the left hand side, has proved to be a very handy tool on this job.

Hauling the Rock

Slope angle in rock cuts is ¼ to 1; in earth cuts it is 1 to 1; and on fills it is 1½ to 1. This means that the shovel has to move out of the rock cut for every blast and then move in again to load. Nevertheless, the agile 43-B makes short work of the moves and keeps eight large pieces of hauling equipment busy, for it averages from 1,200 to 1,500 cu. yds. of rock loaded away every ten-hour day. Two Euclid side dump crawlers of 10-yd. capacity, three Euclid bottom dump crawlers of 8-yd. capacity, two LaPlante-Choate bottom dump crawlers of 10-yd. capacity and one LaPlante-Choate rubber tired bottom dump of 15-yd. capacity comprise the rock and earth hauling equipment. They are hauled by six RD-8 Caterpillar Diesel tractors and two No. 75 Caterpillar tractors. Additional equipment includes a 10-ton Hercules roller and a Caterpillar bulldozer mounted on a No. 75 Caterpillar tractor.

Output in the earth cut was, of course, much higher than in the rock and the 43-B seldom handled less than 2,000 yds. of loose material daily. Messrs. H. G. Campbell and Bruce S. Campbell leave the work in the hands of the superintendent George Kieter. Total excavation handled by the 43-B was about 200,000 yds.

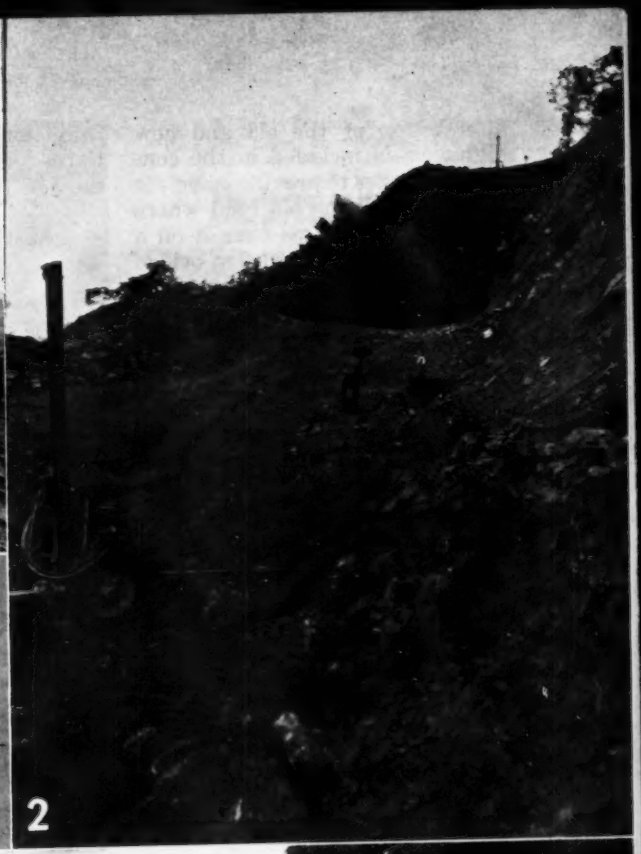


• Top: Rock hauling was handled by Euclid and LaPlante-Choate crawler wagons pulled by Caterpillar RD8s and 75s. A total of 150,000 yards was taken out of this rock cut.
Bottom: The Campbell earth cut which joins the south end of the Roberts job.

Roberts Paving Company Contract

Section No. 3A, 7,904 ft. long, was let to Roberts Paving Co., Salisbury, Md. This contract, starting in its southerly portion, at the northern end of Section No. 3, also runs through a mountain spur on a narrow ledge high above the railroad tracks for a distance of approximately 1,000 ft., thence it, too, passes through a long earth cut and over about 2,000 ft. of high fill and over a long box culvert to the town limits of Marysville. Through Marysville it passes on a relocated and widened street immediately west of the Pennsylvania Railroad Station, crossing over the old Route No. 30, which at this point has turned west and run under the railroad tracks.

A complete lowering and regrading of old Route No. 30 at the



—With clamshell bucket ttached to shovel boom, this Lorain excavated the footing for the concrete retaining wall on the Roberts contract. 2—Blasting in the Roberts rock cut. 3—A crew hustles blasted rock off the tracks. 4—Boulders were lowered by hand to prevent them from rolling down on the tracks. 5—The Roberts 43-B loads a Caterpillar-drawn 14-yard Athey wagon in the earth cut.

intersection of the old and new highways is included in the contract, in order to provide sufficient headroom for the old road where the new one crosses over it on a reinforced concrete girder bridge and also to provide a much easier grade of the old road from the low point of the underpass up to its juncture with the first street west of and roughly parallel to the new highway. This work involved considerable lowering and relocation of sewers and gas and water mains. The overpass and retaining walls on both sides of the old lowered and regraded road are of concrete.

North of the underpass the new highway, still skirting the railroad tracks, passes along on top of the railroad cut immediately west of the tracks. The material in this bank being largely earth and small rocks, it was necessary to construct 588 lineal feet of reinforced concrete retaining wall, the northerly end of which was approximately the northerly limit of Section No. 3A.

The partners of the Roberts Paving Co., Salisbury, Md., are H. B. Roberts, H. W. Roberts, J. B. Roberts and A. V. Williams. Superintendent on the job is Sebastian Macon.

There are no subcontracts on the Marysville job, Section No. 3A. Roberts Paving Company handles all work with its own equipment and employees; Mr. Barner is Resident Engineer on the job for the State.

Rock Problems Similar to Campbells

The difficulties encountered, all of them successfully overcome, include the blasting and handling of large quantities of rock of varying degrees of weight, hardness and accessibility, the building of the reinforced retaining wall immediately adjacent to heavily traveled railroad tracks, and the keeping of these tracks clear of blasted rocks.

The deepest cut in Section 3A is through 90 feet of rock and earth, mostly rock, and involves the handling of 105,568 cu. yds. of material. The highest fill is a huge pile, 57 ft. from bottom to top, and containing 120,555 cu. yds. of material. No borrow is required as there is ample material from the cuts to make all fills.

The right of way, which varies in width from 40 to 50 ft., crosses the box culvert and the two reinforced concrete bridges previously mentioned. The box culvert is of rectangular cross section, 6 ft. x 5½ ft., and is 210 ft. long, built of reinforced concrete. The bridge which carries the new highway over old Route 30 in the town of Marysville is a 27¾ ft. single span reinforced concrete girder structure. The other bridge is a 30 ft. single span reinforced concrete arch. All culverts and bridges are a part of the Roberts' contract and are being built under the supervision of E. V. Kent, bridge foreman.

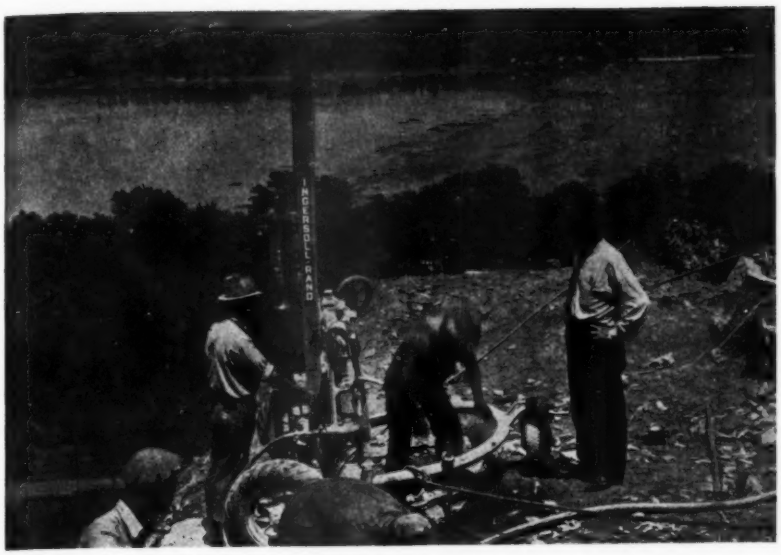
There are 1441 ft. of drain pipe to be installed under the contract. This pipe is plain and reinforced concrete and cast iron depending on the purpose and location and varies in diameter from 14″ to 36″. There are 31 catch basins, all in the contract.

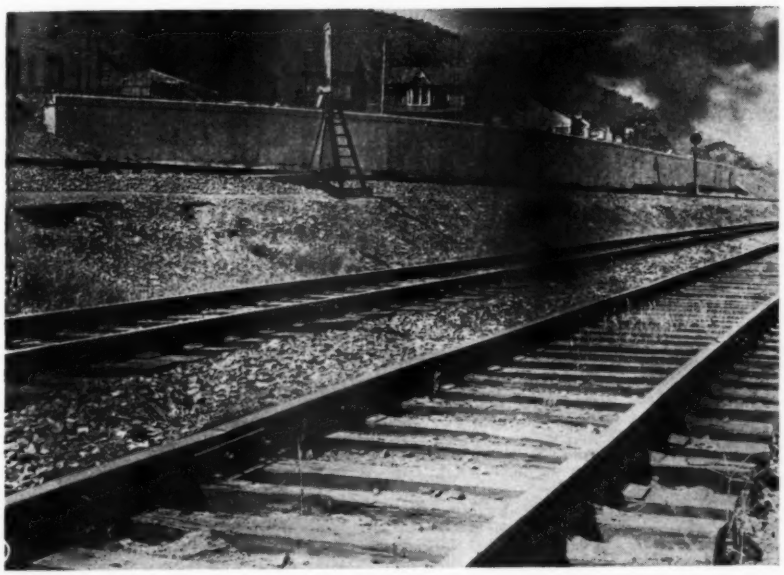
Divided Concrete Paving

All paving is being done by the contractor. Paving is of the Dual type, two strips being laid, separated by a parking strip. The contractor is also to construct about 600 sq. yds. of new concrete sidewalk and to replace old walks which have been destroyed during construction work.

Two shovels are used on the job, a 2 yd. 43-B Bucyrus-Erie, powered with a Buda Diesel motor and a 1¼ yd. 75-A Lorain. The 43-B is used for all heavy excavation work in the big rock cut and loads away an average of 1,500 cu. yds. daily, handling as

• Looking down from the top of the Roberts rock cut you can see how the railroad tracks cut in close to the cliff. Material handled in this cut totalled 105,568 yards.





• Top: Putting a hole down on the edge of nothing. The crew handling the Ingersoll-Rand drill doesn't seem to mind, though. The Susquehanna river is in the background. Bottom: This reinforced concrete wall protects part of the Roberts road in the town of Marysville.

much as 2,100 yds. daily on several occasions, with Messrs. Hart and Payne operating in two 8-hour shifts. The Lorain shovel did the excavating for the culvert, bridges and the long retaining wall. All shovel excavating is in charge of Lonnie Jenkins, shovel foreman. Since all blasting is done in such close proximity to the heavily traveled freight tracks of the Pennsylvania RR it is necessary to schedule the shots at times when the tracks are clear and will remain clear for several minutes following the dislodging of the rock.

Drilling and Blasting

Blasting, under the supervision of Rocco Domjancic, Blasting Foreman, requires the use of four X-71 Ingersoll-Rand drifter wagon drills on rubber tires, four jackhammers and one W-180 Worthington drifter, all working on 90 lbs. air pressure.

Starting size of drill holes is 3" and the depths vary from 24 ft. to 30 ft., the holes ending up 2" diameter at the bottom. Timken and Crucible Steel removable rock bits are used. These bits are shipped to Philadelphia for resharpening and the contractors' experience is that they can be safely resharpened three times before it is necessary to discard them entirely.

Two Ingersoll-Rand No. 315 two-stage, two Worthington No. 315 two-stage and one Ingersoll-Rand No. 110 single-stage air compressors are used on the job.

About 2½ carloads of various makes of explosives are used for blasting. Blast holes are hooked up in series, using No. 6 blasting caps, and fired with a 100-hole battery. On the average 7 lbs. of dynamite bring down one cu. yd. of rock.

Hauling

Due to fissures, there is considerable pot-shotting required, but never sufficient to delay the 43-B which is kept busy loading seven 14-yd. Athey crawler tread side dump wagons, pulled by five RD 8 Caterpillar Diesel tractors and two LO Allis-Chalmers tractors.

On the fills an RD 8 Caterpillar Diesel tractor shoves around a La Plante-Choate bulldozer and an LO Allis-Chalmers tractor pushes a Euclid bulldozer. Two 10-ton Buffalo-Springfield rollers with scarifier attachments are used for compacting fill, and two Adams Road machines, a No. 12 and a No. 14, are used for finish grading.

Slope angle in rock cuts is ¼ to 1. In earth cuts it is 1 to 1 and on all fills it is 1½ to 1. The maximum grade of the highway is 7.28%.

The reinforced concrete retaining wall at the northerly end of Section No. 3A consists of 14 sections, each 42 ft. long and 14" thick at the top. Footings are extra wide and are buttressed. Maximum height of the retaining wall is 15'9" above the top of the footings and a 4' high reinforced concrete parapet is built along the retaining wall for its full length.

From 75 to 100 men are employed on Section 3A, working two 8-hr. shifts under the shovel, on concreting and on certain special work. Occasionally three 8-hr. shifts are worked in emergencies.

Common and semi-skilled labor is obtained through Mr. Gyling of the Federal Employment Bureau at Chambersburg, Pa.

Suburban Development

Speedway Construction Company handles grading, installs water and sewer systems for new residence site.

OUT where the hills of the Alleghenies begin to be green again—out where the smoke and grime of Pittsburgh put their stamp less emphatically upon the landscape, lies that area east of the city that used to be known as North Homestead. Today it is in the fourteenth ward of the city, even though it does lie about six miles east of the "downtown" section. Here, on the bank of Nine Mile Run Creek, adjoining the new, 500-acre Frick Park, recently acquired by the city, we find a new subdivision of about a hundred acres that is being changed from rolling farm land to sites for one hundred homes suitable for families of moderate income. Ye Olde Swissvale Farme is the name of the new development, and in these late thirties when new land developments carried forward by private enterprise are so few and far between, it earns recognition by the very fact of the enterprise that has called it into being. . . .

However, there are other characteristics that make these new homes worthy of note.

10-Unit Construction

When Robert G. Jackson, who owns the land, decided to turn it into relatively small plots for the building of medium priced homes, he appointed Thos. J. and John Horrocks, who have long been associated with him, his agents to see the work through in the most expeditious manner possible; he also named Alex Hutchinson of Wilkinsurg, Pennsylvania, as engineer. That these men have carried out their trust effectively is indicated by the fact that, although only started last September, the work has progressed to the point where the first of the homes is to be started during the month of May. The first ten houses will be completed in the fall of 1938, and the next ten started when the first five are sold.

30,000 Yards of Grading

On September 10, 1937, the contract for grading and putting in sewer and water systems was let to the Speedway Construction Company of Pittsburgh. The thirty thousand yards of grading involved in the contract was composed almost entirely of shale and clay, and Speedway moved in on the job a rented Bucyrus-Erie 1-yard B-3 steam shovel which they served with three Ford trucks with two yard bodies, and one relay truck with a five yard box. Mud conditions were pretty bad during the grading work, and the thousand-foot haul kept the trucks busy to keep up the average of seventy-five yards per hour that the outfit made on the job. On the dump, a Caterpillar thirty, and a Caterpillar sixty, each equipped with bulldozer, were kept busy spreading the dirt, and keeping the trucks moving.

In December the Company purchased a new Bucyrus-Erie 19-B gasoline machine equipped with both drag-shovel and shovel front end, and then were confronted with a two months' delay caused by a delay in the approval of the plans for the water and sewer

• Sixty-five hundred feet of vitreous sewer pipe was laid in this 35-inch-wide ditch. The 19-B dragshovel took about 8,000 yards of clay and rock from the ditch. Note the section of pipe just going into the hole.

• Top: The contract for this subdivision involved about 30,000 yards of grading. The mounds scattered about are top soil which is being saved for the house owners to use on their yards. Bottom, left to right: Francis Kitchen, Speedway president and shovel operator; John Calfo, secretary and foreman; John Kronenkamp, inspector; and Wesley Welfer, treasurer and tractor operator.

pipe lines. The sewer called for some 8,000 yards of excavation, 6,500 feet of vitreous pipe running from 12-inch to 18-inch. The ditch was all dug about thirty-five inches wide, and the material encountered ran about fifty per cent rock, and fifty per cent clay. When the last of the vitreous pipe was placed just before the first of April, the smell of the tar bucket and hanks of oakum were banished from the pretty suburban-section-to-be.

Pipe-laying Completed in April

But the smell of tar, and the piles of sewer pipe, now made way for piles of six inch water pipe from Alabama, and the excavation problem became the moving of 4,000 yards of half clay and half rock, the installation of 6,200 feet of water pipe, and the inevitable back-filling. The last length of water pipe was finally lowered into the ditch just before the first of May, and the three officials of the company sat back to take stock of the difficulties overcome and the problems solved . . . Francis Kitchen, President and shovel operator; John Calfo, Secretary and foreman; and Wesley Welfer, Treasurer and Tractor Operator, have had no little experience in this dirt moving business, and even when the jobs are unexpectedly tough, they usually manage to come out on the right side of the ledger.

Perhaps the most vivid memory in their minds was the ground conditions encountered during that winter work, and the grades necessary to negotiate in handling the drag shovel through the pretty ravine with its several fish pools. In one place, on a grade that the boys swear by all that is good and holy was at least 25 per cent, they struck a real soft spot and the little old gas rig went down in so that her cats and entire base were down in the soup. She crawled out under her own power, but they worked her on mats the rest of the distance across the soft stretch.

And if the wandering reporter is allowed a word or two, he'd like to say, as he stood on the hill with the setting sun behind him and looked down over the subdivision, three things remained in his mind. One was the Trackson front end shovel mounted on an International 230 tractor and used to deliver material on the job when it would have been utterly impossible to use trucks. Running around the job over almost impossible ground conditions, this little machine was used to deliver small batches of brick, coal, pipe, sand and gravel.

Mobile Office

The second thing was the heavy skids and chain hooks under each tool box and under the little field office. As the job moved along, the tool boxes and the office moved right along with it. It was a very simple matter to hook on any one of them and pull them right along with the job. The office, incidentally, was 8′ x 12′ and while it wasn't exactly finished like a Pullman car, it had a nice efficient coal stove in it and some benches to rest weary bones. And the third memorable thing was a very unprofessional reflection that covering that job might have been a lot easier if all the top soil hadn't been left in huge mounds to be put back in place around each house as it was finished.

New York's Sixth Avenue Subway

New 2¼-mile line presents a variety of tough construction problems and requires special construction methods.

By MORT FRIEDLANDER

IF you ask one of the contractors what he thinks of the Sixth Avenue Subway now being built in New York City, you'll probably get a grunt for an answer. If verbally inclined, however, he might yield enough to comment, "Man, it's a honey." There's not much else that can be said to describe briefly the toughest subway job yet encountered. Excavating methods employed vary from compressed air shield tunneling to cut and cover in rock, sand, and clay. Obstacles to progress are both natural and man-made. Meanwhile, a variety of services and traffic must be maintained uninterrupted through one of New York's busiest retail shopping centers.

Overhead along the entire route the old Sixth Avenue Elevated, carrying more than 100,000,000 passengers a year, is to be kept in operation during construction at a cost of more than $5,000,000. At street level vehicular and pedestrian traffic continue normally except for local and temporary interferences. Below the surface the new line crosses over three established rapid transit systems and under two more, with varying degrees of clearance from nothing up, to say nothing of complications caused by parallel systems and existing underground stations. Scores of large buildings have to be underpinned. One of the accompanying drawings reveals to some extent the difficulty of new underground construction in a city where more than 5,000 miles of gas mains, 35,000 miles of electric cables, 4,000 miles of water mains, and literally millions of miles of telegraph and telephone wires lie within seven feet of the pavement. In the past the cost of bypassing gas mains alone has been about 1.9% of the total of subway construction, running as high as $400,000 a mile.

When completed, the new line will be 2¼ miles long, extending from West Ninth Street to West Fifty-third Street and forming the final tie in the municipally owned and operated 55 miles of the Independent System begun in 1925. Connecting with Brooklyn at its southern extremity, branches will radiate from Fifty-third Street to upper Manhattan, the Bronx, and Queens. With completion of this project, subway trackage in New York City, exclusive of yards and sidings, will total 1,100 miles.

• The picture on the opposite page shows some of the difficulties being met in the 6th Avenue subway construction. Gas, electric and water lines obstructed excavation; elevated posts had to be specially supported, and plank decking had to be laid to keep the street open for traffic.

Costs and Specifications

The record high cost of the new subway is largely a reflection of interference with construction on the part of transportation and utility services which cannot be interrupted. In addition to those already mentioned, special care must be taken in the course of excavation to prevent damage to the important City Tunnel of the Catskill Aqueduct which runs 200 feet below Sixth Avenue and supplies water to a large area at an invert pressure of about 450 feet.

Although the job is only 2¼ miles in length it has been let out to six contractors (see Table 1) with separate specifications for each in order to meet varying conditions. Those described here apply to Section 11 which is in the hands of the George H. Flinn Corporation. The general requirements, however, are substantially the same as those governing the rest of the work where it is similar.

Initial excavation, except where tunneling is required, is always cut and cover. A first shallow opening is made to rock, or to such

TABLE 1

Section	Limits (streets)	Contract Price	Struct. Length	No. Tracks	Track Length	(UNIT COSTS) Struct. (per ft.)	Track (per ft.)	Contractor
6	9-18	$6,959,000	2,410 ft.	2	4,821 ft.	$2,860	$1,430	Spencer, White & Prentiss, Inc.
7	18-27	4,715,864	2,450	2	4,900	1,925	962	Arthur A. Johnson-Necaro Co.
8	27-33	6,392,879	1,443	2 & 4	4,022	4,430	1,589	The Carleton Co., Inc.
9	33-40	7,834,607	1,787	4	9,736	4,384	805	Park Contracting Corp.
10	40-47	5,583,768	1,858	4	7,432	3,005	751	Rosoff Brader Constr. Corp.
11	47-53	4,616,476	1,864	2, 4, 6	8,550	2,476	540	Geo. H. Flinn Corp.

depth as may be required in order to afford working space below the street decking. This is followed by a second lift which carries down to a depth of approximately thirty feet below the street level. The lowest stage then follows as closely as possible until subgrade is reached. It is required that progress be so planned that the structure of the subway proper is at all times in place not more than 80 feet behind the face of the bottom lift of the excavation opened up ahead.

Traffic Maintained

Constant maintenance of an open thoroughfare to very heavy traffic presents a variety of difficulties. The contractor is not permitted to maintain more than one opening of less than 100 feet in length in every other block during the day. At the same time, however, either the center traffic lane between the existing Elevated columns or both outside lanes, adjacent to the curbs, must be kept open.

Excavated material is removed from the trenches below the decking through open hatches by means of truck crane hoists which empty into waiting trucks. The material is hauled a distance of from two to four miles and dumped along the Hudson River at points designated by the Park Department. Because of the heavy traffic loads that the temporary decking is obliged to carry, it is designed to support a live load of two hundred pounds per square foot, or a ten-ton load transmitted by a single axle through two wheels spaced on five foot centers and located in the center of any area of ten by ten feet. Gas pipes that cannot be dispensed with have to be bypassed. The larger transverse mains are carried across the decked street, out of the way of traffic, on suspension cables supported by steel towers that are located back of any line of possible ground failure.

Backfilling, after completion of the subway, will be allowed to stand at least two weeks before any subsurface structure is placed upon it. In this time it will be flooded at least three times. A shrinkage factor of fifteen per cent is figured in filling to rough grade.

TABLE 2

UNIT PRICES ON SECTIONS NO. 6 & 11 SIXTH AVE. SUBWAY

Item	Contract 6 Unit Price	Contract 11 Unit Price
1) Earth excavation	11000 yd/$10	65000 yd/$ 5.30
2) Rock excavation	3150 yd/$20	35000 yd/$ 9.10
3) Tunnel excavation	9330 yd/$50	17900 yd/$13.40
4) Tunnel excavation—earth, comp.	6800 yd/$60	
5) Tunnel excavation—rock	2500 yd/$60	
6) Tunnel excavation—air, earth, rock	5250 yd/$60	

The total cost of the Sixth Avenue Subway structure proper, including all six sections, will be $31,486,118. This is an average of $2,760 per foot of structure or $4,205,000 per track mile. However, owing to the differences in the sections and the obstacles encountered, the costs of individual contracts depart widely from this (see Table 1). The highest cost per foot of track is sustained on Section 8, where the system will operate as a two-track local service built alongside the present Hudson & Manhattan Railway whose terminal at Thirty-second street must be rebuilt six feet above its present elevation (see Fig. 12). The lowest cost per track mile is along the George H. Flinn Corporation contract which is cut and cover for the greater part with subgrade all in rock and as many as six tracks.

Contracts

The southernmost division, Section 6, which is designed for two-track local service, was awarded to Spencer, White and Prentiss, Inc. by the New York Board of Transportation in May 1937. This is the only part of the project where a part of the work must be done by means of shield driven tunnels operated under compressed air through sand and clay for about 800 feet. At Thirteenth Street, and for about five blocks north after leaving the tunnels,

• Keeping the street open was part of the job. In this view, decking is in position over the outside lanes only. Excavated material was brought to the surface by clamshells, through openings like the one in the foreground.

• Top: This view shows one half of the two-track rock tunnel at Forty-sixth Street. Note central pillars and first section of lining. Bottom: Showing concrete piers which support elevated columns at approximate sub-grade.

each track enters its own box-like structure, built by cut and cover. One of these will lie on either side of the present Hudson & Manhattan railway which is located directly below the center of Sixth Avenue.

Except for the tunnels and approaches, the work was prosecuted as follows. Master piles were driven on 10 foot centers to rock. The opening was then carried down by using 4" x 8" planks between the flanges of the master piles. Natural drainage dewatered the fine sand encountered into ditches a foot at a time, the material being removed as it was drained. As the excavation proceeded, horizontal boards were placed singly around the entire perimeter, being separated by 1½" spaced and packed behind with gravel.

To reach the shield tunnels, two 18-foot work tunnels were first driven in normal air through rock. This excavation was done by two Bucyrus-Erie tunnel shovels operated by compressed air at a throttle pressure of 100 lbs. Under conditions of extremely small working clearance their performance was very satisfactory, with additional advantages of causing no dangerous exhaust gases and requiring no electric cable lines. The output in the approach tunnels was subject to the difficulties of removing the materials after they had been dumped into skips on flat cars. About 60 yards per four hour-shift in each tunnel was all that could be handled by the flatcars. Large, quick bites of the compressed air shovels greatly facilitated the removal of about 4,000 yards in this way. Power was transmitted to them by means of a fifty foot flexible 4" line hooked up to a 4" steel line communicating with the compressor plant.

North of the Spencer, White & Prentiss job, Sections 7, 8, 9, and 10 extend from Twenty-seventh Street to Forty-seventh Street. This length includes the deepest open cut on the new subway, at Thirty-third Street, where the base of rail is 67 feet below the street. Three blocks south of this point the subway emerges from single-track rock tunnels about 1,200 feet long. In these tunnels the maximum grades are reached —four per cent down and three per cent up.

The Toughest Spot

The most difficult conditions are encountered in and near the Herald Square zone, where the old Hudson & Manhattan Railroad terminal must be raised six feet to permit passage beneath it. Just north of this terminal the Pennsylvania R. R. Long Island Tunnels cross underneath the new system which shifts from two-track local to four-track local and

(Continued on page 394)

EXCAVATING ENGINEER

A Monthly Publication
Devoted to the Excavating Industry

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Let's Spend It Wisely

The new billions appropriated for pump-priming should cause every thinking citizen to ask "What are we getting for our money?" Although few people realize it, the United States already has the highest per capita tax bill of any country in the world. Although new large scale spending will increase that bill, the principal consideration at present should not only be the *amount* being spent, but also the results achieved *by* the spending.

Past experience with pump-priming indicates that this measure is not sufficient to bring back normal business conditions. If this holds for the spending now to be done, and there seems to be nothing that promises more success than was achieved before, the best that can be hoped is that the new billions will be so used as to get the most efficient results possible.

Excavating Engineer has always favored government support of highways, for example. There is a real need for a better, more modern highway system. Since road-building is largely handled on a contract basis, it is done efficiently and gives taxpayers real returns for their money. Contractors employ men, pay high wages, pay taxes, and buy materials and supplies. They invest in expensive modern equipment so they can work efficiently —so they can give results at low cost. It would seem obvious, therefore, that stimulating the contracting industry would benefit the public, industry and government itself. Funds spent in "priming the contracting pump" are not only well spent from the "emergency" angle, but are also an investment with a real and lasting return. Such spending is not wasteful, and it is wasteful spending which must be cut.

In passing the Hayden-Cartwright Bill, in supporting flood control, housing and other needed development programs which are largely handled on the contract system, the government shows its recognition of the need for and wisdom of this type of work.

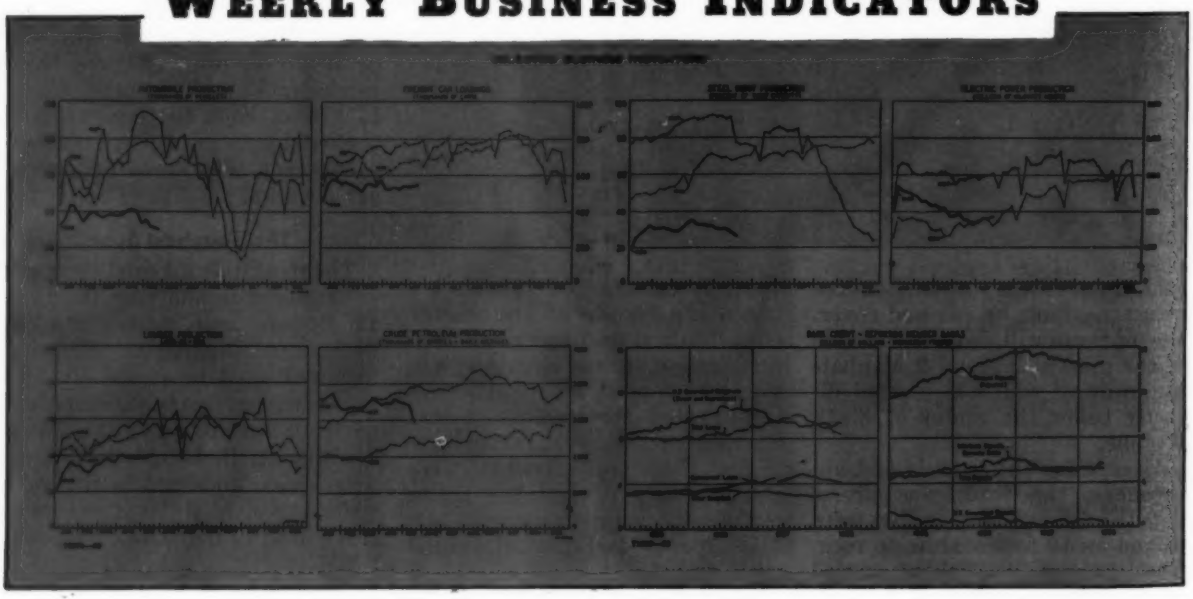
In spending the far larger "emergency" funds, however, the administration seems to lose sight of sound economics and common sense on the ground of putting men to work in a hurry. Certainly the unemployed must be cared for, but the present emergency spending way of doing it not only prevents any immediate solution of the problem, but badly hinders any long term solution.

For example, what happens when W.P.A. funds are used to build roads, public buildings, parks, etc., "by hand"? The men employed draw wages—but lower wages than contractors doing the same work would pay. The projects may be completed and be useful — but they have been longer in building, are likely to be less well done. There is no stimulation to private business. The cost of the projects is not only far greater than if they were built by private contractors, but is likely to exceed even the generous amounts allocated to them as well.

But perhaps more serious than all of these combined, the moral character of the men employed is permanently harmed. Easy work, easily obtained, breeds the idea that the government owes the individual a living whether he really wants to work for it or not. Individual initiative is stifled and a class of permanently inefficient non-workers is built up—to be a permanent burden on the rest of the country.

Further, in doing such work by inefficient hand labor methods, the government is directly competing with private industry. In

Weekly Business Indicators



so far as it reduces the amount of work for private contractors, it reduces industry's ability to pay both wages and taxes; reduces the country's ability to support or to re-employ the unemployed.

Where the Army Engineers, for example, handle work by force-account rather than contract, it is because they can "bid" the work in for a lower figure than they can let it to contractors. It is handled on a non-political basis and by modern methods economically sound from the standpoint of those employed and the taxpayer who foots the bill. When this can be done, and the job handled for the estimated cost, including legitimate cost factors which private industry would have to pay, there can be no valid objection to the force-account method. But where construction funds are spent merely to get men at work fast regardless of the efficiency of the work or the lasting value of the job done, there is waste of money, lowering of morale, encouragement of political corruption and racketeering . . . the country as a whole would be better off to use the efficient method—the contract system. Even if this meant caring for the unemployed by the dole system, the recipients would be no worse off morally, mentally or physically than they are under a system which fosters inefficiency, "made" work and "shovel-leaning."

Sometime we must stop spending money inefficiently. Why should not that time be now?

What Does Government Cost Us?

The average person in this country has little or no idea of the amount he actually pays in taxes. If he pays an income tax, he knows what that is, and probably groans at the size of it. If he lives in a state with a direct sales tax, he may have a general idea of how much is added to the cost of his purchases on that account. But of the staggering total of taxes they pay, most individuals have no accurate knowledge.

In a recent editorial in the New York Herald Tribune, Harry Scherman points out that the per capita taxes collected by federal, state and local governments in the United States for the year ending March 31, 1938, totaled $107. This is the same amount as was collected per person in Great Britain—the country we generally consider as having the highest taxes in the world! But even this does not tell the true story. Money spent by government, and not taxes collected, is the true measure of the cost of government. When our rapidly increasing deficit is added to taxes collected, we find that our per-person cost of government is considerably higher than even Great Britain's. The latest authoritative, government figures available, for 1936, show the real cost of government as $133 per person for the United States and $123 for Great Britain.

Even this will not give you the full picture of what you pay for government. Mr. Scherman calls attention to the fact that most of us live our economic lives as families, not as individuals. The family usually has one income from which to pay taxes on all its members. The average per-family taxes for the current fiscal year are $523 in the United States. If rural families, with small cash incomes are eliminated, of course, the figure becomes considerably higher.

Whether you realize it or not, the cost of government means that your family income is probably more than $523 a year smaller than it otherwise would be.

During these sub-normal years, the necessity of relief is often given as the reason for the high cost of government. The actual fact is that only $90 out of the above-mentioned $523 will go for relief in the current fiscal year. Without any relief payments at all, government would still be costing the average family $433 this year! The desire not to let the needy starve is obviously no justification of the size of our present bill for government.

"Economy without suffering" is perfectly possible.

A. P. Van Schaick

Arthur P. Van Schaick, Vice President of the American Chain & Cable Company, Inc., died at midnight, June 7, while traveling from New Orleans to Chicago. Following a month's vacation at Beaumont, Cal., Mr. Van Schaick was en route with Mrs. Van Schaick, to their home at Southport, Conn.

As Vice President in Charge of Sales for the American Chain & Cable Company, Mr. Van Schaick's duties carried him to all parts of the country, and he possessed a wide acquaintance in the field. He was also a Director of American Chain & Cable Company, a director of the Chain Institute, and former President of the American Hardware Manufacturers' Association. His early business experience was with Pittsburgh Plate Glass and Lackawanna Steel. In 1919 he joined the American Chain Company at Bridgeport, Conn., as Manager of Sales. Several years later he was elected a director, and three years ago was elected Vice President in Charge of Sales of all divisions.

May Best Construction Month Since Last July

Total construction contracts awarded in the 37 Eastern States during the month of May reached the largest dollar total since July of last year, according to F. W. Dodge Corporation. The May 1938 total figure was $283,156,000, which was an increase of 28 per cent over the preceding month, and an increase of 16 per cent over May 1937. While the increase was largely in the heavy engineering classifications, residential building also showed a decided increase over the preceding month and compared more favorably with the corresponding month of 1937, than has any preceding month this year. Privately financed work of all kinds was only 8 per cent less in dollar volume than in May of last year, while publicly financed work increased 55 per cent.

Residential building contracts, with a total of $83,153,000, were only 1 per cent behind May of last year, and represented the largest dollar volume recorded since June of last year. Eight out of a total of fifteen districts showed increased residential building, as compared with May of last year. The May figure also increased 11 per cent over the preceding month. It did not include any large public housing projects under the United States Housing Authority program. The accumulated total of residential building contracts for the first five months of this year was $313,356,000; while this was 26 per cent under the first five months of 1937 (the peak period of the last recovery cycle), it remained 20 per cent ahead of the first five months of 1936.

NOT in the *Contract*

Visitor—Is your clock right?

Bored Host—The one on the mantlepiece? No, we call it "the Visitor."

Visitor—How is that?

Host—It never goes.

French Sentry: "Halt! Who goes there?"

Voice: "American."

French Sentry: "Advance and recite 'The Star-Spangled Banner'."

Voice: "I don't know it."

French Sentry: "Proceed, American."

First Operator: "I had a beard like yours once, but when I realized how it made me look I cut it off."

Second Operator: "I had a face like your'n once. When I realized that I couldn't cut it off I grew this beard to cover it."

Jingle: "First it was love. He fascinated me—and I kissed him!"

Bells: "Yeah, I know, and then he began to unfascinate you—and you slapped him!"

Salesman: "I sell underthings to nudist colonies."

Farmer's Daughter: "What kind of underthings do nudists need?"

Salesman: "Cushions."

Super: Define "courtship".

Foreman: A man running after a woman until she catches him.

Traffic Cop (bawling out motorist): "Don't you know what I mean when I hold up my hand?"

Lady motorist (meekly): "I ought to. I have been a school teacher for 25 years."

The patience which many of our well intentioned public officials show in pushing this and that plan to change over the world instanter, reminds us of the following story:

"There was a young woman in my home town who had been very, very carefully brought up, shielded from the world, almost cloistered. She married. The morning after the wedding she looked around the room and exclaimed: 'Why, where is the baby?' "

St. Peter was interviewing the fair damsel at the pearly gate.

"Did you, while on earth, indulge in necking, petting, smoking, or dancing?"

"Never," she retorted, emphatically.

"Then, why haven't you reported sooner?" said St. Peter. "You've been dead a long time."

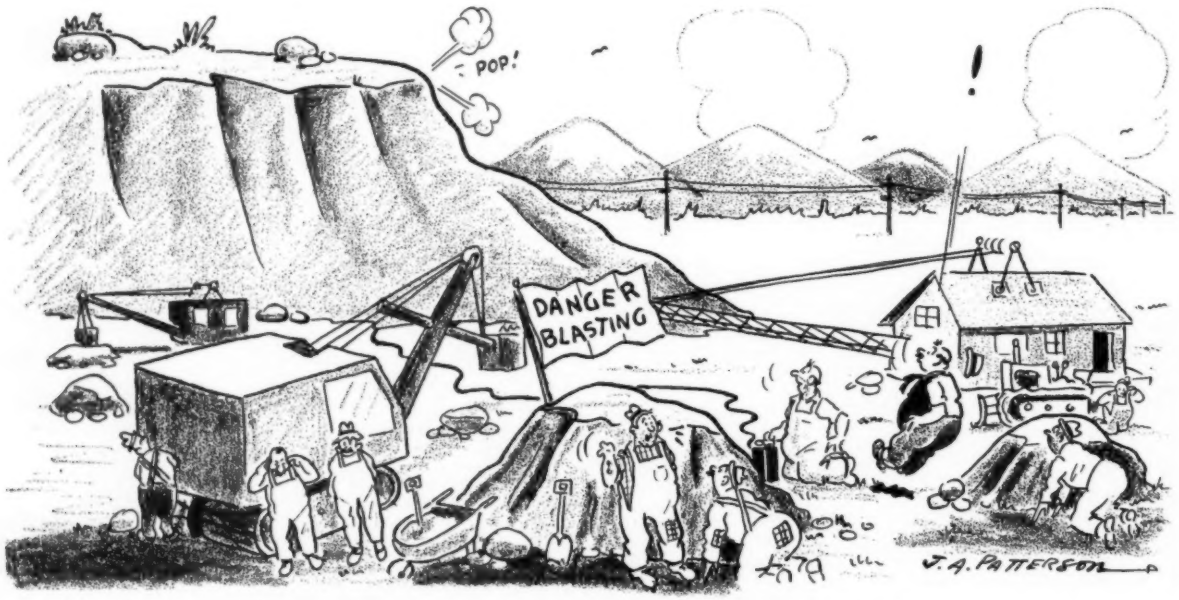
Anatomy Prof.: "What are the names of the bones in your hand, Mr. Blunt?"

Mr. Blunt: "Dice."

Hawiian Belle. "That artist wanted to paint my bust. Are the colors hard to get off?"

A tightwad who was out of town for his wife's birthday sent her a check for a million kisses as a present. The wife, a little annoyed at his thrift, sent back a post card:

Dear Jim: Thanks for the perfectly lovely birthday check. The milkman cashed it for me this morning.



"The powder man hooked a fire-cracker to the blasting machine for a joke."

More Work from Explosives with CORDEAU·BICKFORD

Because Cordeau-Bickford Detonating Fuse is in direct contact with the entire charge, giving every cartridge in the hole the maximum force and effectiveness of a primer cartridge. Regardless of whether the charge is continuous or broken, the result is better fragmentation, with obvious savings in time and effort required for removal of material following every Cordeau-detonated blast.

THE ENSIGN-BICKFORD CO. • SIMSBURY, CONN.
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CORDEAU·BICKFORD *Detonating Fuse*

For your convenience in writing to The Ensign-Bickford Company, you will find a card bound in this issue.

Equipment you ought to KNOW ABOUT

Brooks Load Lugger

A new load lugger has recently been manufactured by the Brooks Equipment and Manufacturing Company of Knoxville, Tennessee. Uses for the Brooks Load Lugger cover many types of work. A few of which are: rock quarries, transferring of stone from quarry to

crusher — for hauling concrete aggregates, brick and tile. It offers low cost service to fertilizer plants, gypsum and other mines. In cities, on busy or narrow streets, the Load Lugger is used in sewer excavation work, as well as all other types of public work.

New Truck Models

Mack Trucks, Inc., has just announced production of six new cab-over-engine models rated at from 12,000 to 23,000 pounds gross. Each one of these six new models is characterized by streamlined design and is of all-metal construction. All six models are powered by six-cylinder engines, with horse-power ratings ranging from 75 to 100 h.p. at 2,800 r.p.m. Crankshafts have seven bearings

and are fully counterweighted on every throw, while drive is from a dry, single plate clutch.

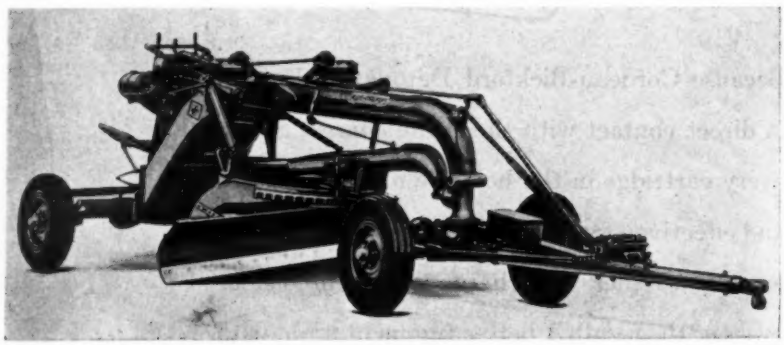
Welding Electrodes

Three new arc welding electrodes, each protected by a heavy extruded coating, have been announced by General Electric's Industrial Department. These electrodes, designated as Type W-20E, Type W-22E, and Type W-23E respectively, are intended for shielded arc welding of mild steel.

Road Graders

Two models of the new line of graders, the numbers 110 and 112, being manufactured by the Tractor Division of the Allis-Chalmers Manufacturing Company, were first shown to the trade at the Cleveland Road Show in January, 1938.

A construction feature of the machine is the patented Allis-Chalmers leaning frame. The frame lean and long, fully shiftable rear axle gives the machine effective stability. The leaning frame enables the operator to concentrate the weight of the machine on the blade when desired. Operator comfort, and ease of operation of the controls are accomplished by use of the frame lean, which provides a level spring-mounted platform, even though the rear axle is inclined on a 25 degree slope. Leaning wheels furnish additional stabilizing force to hold the grader on steep bank cutting positions.



NEW EQUALIZING BRAKES *assure faster and safer trips*

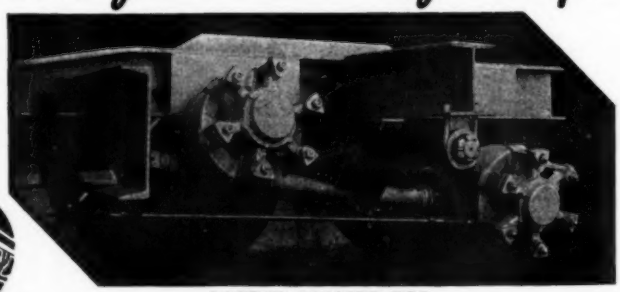
• Brake "grab" and brake "walk" formerly encountered in trailer brakes have been entirely eliminated in the new Rogers system of equalizing brakes.

Compensating levers keep all brakes in constant readiness for instant and effective application and release, regardless of extreme oscillation of the wheels laterally or longitudinally.

For faster and safer operation under all conditions of road and load, buy a Rogers Trailer.

ROGERS BROTHERS CORPORATION
136 Orchard St. • ALBION, PENNA.

ROGERS HEAVY DUTY Gooseneck Trailers



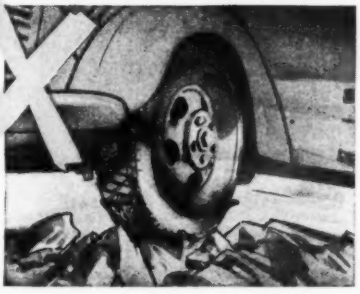
PATENT APPLIED FOR

For your convenience in writing to Rogers Brothers Corporation, you will find a card bound in this issue.

"AND THAT'S ONLY ONE REASON WHY WE CHANGED TO ATHEY HAULING UNITS!"

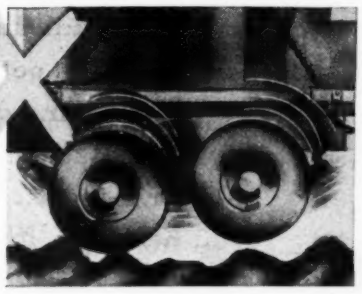
If you haul with trucks, do you actually *know* your tire costs per mile . . . per yard . . . or per hour? If you bought trucks for speed, do you *know* the real average speed your trucks travel *when off the pavement?* Tired of paying for truck repairs they didn't foresee—and speed they don't get—many operators today are turning to Athey Forged-Trak Hauling Units, pulled by "Caterpillar" Diesel tractors. See your "Caterpillar" dealer or write us.

NO HIGH TIRE REPLACEMENT COST



Toughest rubber tires can't stand up under the gouging, gashing and ripping of sharp rocks—frozen chunks of mud, gnarled roots and stubborn stumps! Athey Forged-Trak Wheels are not affected by these rubber tire hazards. They over-ride or beat down all such opposition.

NO COSTLY ROAD MAINTENANCE



When you use Athey Forged-Trak Hauling Units, you don't need to spend good money maintaining a smooth roadbed. The broad, firm tracks of Athey equipment actually *improve* the road on which they travel . . . surmount or beat down obstacles. And Athey wheels are *non-miring.*

NO CONSTANT, EXPENSIVE REPLACEMENT

Hauling with trucks means frequent outlay for badly worn and bruised tires, rear axles and other parts . . . replacing the entire hauling unit within a relatively short time. With Athey Forged-Trak Units, you don't have to worry about washboard roads—slippage—overloads that attack tires.

ATHEY TRUSS WHEEL COMPANY, 5631 West 65th Street, CHICAGO, ILL. *Cable Address: "Trusswheel," Chicago*

ATHEY FORGED-TRAK REG TRADE-MARK **ATHEY WAGONS & TRAILERS**

4-Wheel Drive Truck

One of four FWD Model M-10 trucks purchased by Westchester County, New York. These trucks are to be used in hauling rock from the Delaware aqueduct, now being built for New York City water supply by private contractors. Westchester County uses the rock from the aqueduct on its county roads. An estimated 400,000 cubic yards of rock are to be hauled which it is estimated will take four years. The trucks will operate on both new and unbuilt soft roads.

3½-S Mascot Mixer

A new 3½-S Mascot has been designed and built by the Kwik Mix Concrete Mixer Company, of Port Washington, Wisconsin. It is said to be the greatest advance in small mixer design. Compact construction, with an air-cooled gasoline engine mounted within the natural overall dimensions of the mixer proper. No additional structure has been added for this purpose, to unnecessarily increase the overall dimensions of the mixer. The end discharge feature permits wheelbarrow spotting, without turning or backing. Less than 1,000 pounds, it is easily handled, spotted or trailed. Many additional features add to the efficiency of this machine.

New Tire Announced

A new Silvertown truck and bus tire, its first line product for commercial service, is announced by The B. F. Goodrich Company. The new tire is built with the recently announced Hi-Flex cotton tire cord, designed primarily to reduce high speed tire heat.

It is claimed that so-called artificial stretch is removed before the cord is built into the tire, resulting in a more compact, smaller-gauge product, which returns to its original position after being stretched. The old-style cord frequently lost its elasticity very early in hard service.

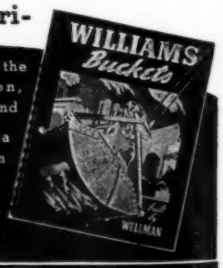
WILLIAMS *Buckets*

The Williams Line includes Power-Arm Multiple Rope, Power Wheel, Single Line Hook-on and Dragline Bucket.

Distributors located in all parts of the country are competent to render valuable field service.

Built to Last . . . and Move Dirt Fast!

No "dead-head" metal rides in Williams Buckets—you swing pay loads, not inert metal! The special welded construction of Williams Buckets eliminates excess weight—makes them stronger, and more enduring. Williams Buckets are powerful diggers. They bite full loads smoothly and easily, open quickly and dump cleanly. A Williams Bucket can play a big part in making excavating or material handling more profitable.



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Shots from the FIRING LINE

President Signs Highway Bill

President Roosevelt signed the new Hayden-Cartwright road legislation on June 8, after differences between Senate and House measures had been ironed out in committee. This act authorizes the expenditure of $158,500,000 in federal aid for highways during the fiscal year 1940 and $191,000,000 during the fiscal year 1941. This means that more, better and safer roads are going to be provided for the use of 29,000,000 American motorists.

The 1940 authorizations are divided as follows: Federal-aid primary system, $100,000,000; secondary or farm-to-market roads, $15,000,000; protection and elimination of railroad grade crossings, $20,000,000; forest roads, $10,000,000; national parks and parkways, $10,000,000; Indian roads, $2,500,000, and public land roads, $1,000,000. Expenditures for 1941 will include $115,000,000 for the primary system, $15,000,000 for secondary roads, $30,000,000 for grade crossings, $13,000,000 for forest roads, $13,000,000 for national parks and parkways, $3,000,000 for Indian roads and $2,000,000 for public land roads. In addition to these amounts, an emergency fund of $8,000,000 for the repair and reconstruction of highways damaged by floods or other disasters is provided for by this act.

Although these sums are reductions from the amounts set up in the original House Bill, the addition of $150,000,000 previously allocated but not matched by the states, can bring the total to approximately the original amount. The new increased diversion penalties recommended by the House are not in the Bill as passed, which means the previous penalty provision remains in effect. This permits penalizing diverting states up to one-third of their total Federal-aid funds.

Shasta Dam Bids Opened

Pacific Constructors, Inc., of 609 South Grand Avenue, Los Angeles, a syndicate of 12 contracting firms, was the low bidder at $35,939,450 for construction of Shasta Dam. Bids were opened by the Bureau of Reclamation on June 1.

One other bid was submitted, by the Shasta Construction Company, a syndicate of nine firms, at $36,202,357.

Stockholders of Pacific Constructors, Inc., are Griffith Co., Los Angeles; Metropolitan Construction Co., Los Angeles; Lawler & Maguire of Butte, Montana; The Arundel Corp., Baltimore, Md.; American Concrete & Steel Pipe Co., Los Angeles; Foley Bros., New York City; D. W. Thurston, Los Angeles; Shofner, Gordon & Hinman, Denver, Colo.; W. E. Callahan Co. and Gunther Shirley Co., Dallas, Texas; A. Guthrie & Co., St. Paul, Minn.; L. E. Dixon Co., Los Angeles; and Hunkin-Conkey Co., Cleveland.

Stockholders of Shasta Construction Company are J. F. Shea Co., San Francisco; MacDonald & Kahn Co., San Francisco; Morrison-Knudsen Co., Boise, Idaho; General Construction Co., Seattle; Pacific Bridge Co., San Francisco; Guy F. Atkinson, San Francisco; Walsh Construction Co., Davenport, Iowa; Henry J. Kaiser Co., Oakland, Calif.; and Utah Construction Co., Ogden, Utah.

W. R. Young, Central Valley Project construction engineer, said both bids will be considered before a contract is awarded by the Secretary of the Interior. The specifications provide that the successful bidder must start work within 30 days after receipt of an official notice from the Government to proceed with construction.

The contractor will be allowed 2,000 calendar days, or about 5½ years, to complete the job. Liquidated damages for delay will be assessed the contractor at the rate of $2,000 a day.

Shasta Dam will be erected across

ESTIMATED APPORTIONMENTS OF FEDERAL AID HIGHWAYS AND GRADE CROSSING FUNDS FOR THE FISCAL YEAR 1940

STATE	Federal aid	Secondary or feeder	Grade Crossing	Total
Alabama	$ 2,070,000	$ 310,000	$ 394,000	$ 2,774,000
Arizona	1,423,000	214,000	126,000	1,763,000
Arkansas	1,698,000	254,000	346,000	2,298,000
California	3,768,000	565,000	730,000	5,063,000
Colorado	1,810,000	271,000	253,000	2,334,000
Connecticut	625,000	94,000	167,000	886,000
Delaware	487,000	73,000	98,000	658,000
Florida	1,329,000	199,000	277,000	1,805,000
Georgia	2,511,000	377,000	478,000	3,366,000
Idaho	1,226,000	184,000	162,000	1,572,000
Illinois	4,053,000	608,000	1,032,000	5,693,000
Indiana	2,437,000	365,000	508,000	3,310,000
Iowa	2,548,000	382,000	545,000	3,475,000
Kansas	2,614,000	392,000	508,000	3,514,000
Kentucky	1,830,000	274,000	358,000	2,462,000
Louisiana	1,426,000	214,000	311,000	1,951,000
Maine	867,000	130,000	136,000	1,133,000
Maryland	810,000	122,000	203,000	1,135,000
Massachusetts	1,371,000	206,000	409,000	1,986,000
Michigan	3,010,000	452,000	648,000	4,110,000
Minnesota	2,709,000	406,000	526,000	3,641,000
Mississippi	1,749,000	262,000	311,000	2,322,000
Missouri	3,005,000	451,000	598,000	4,054,000
Montana	2,034,000	305,000	261,000	2,600,000
Nebraska	2,054,000	308,000	348,000	2,710,000
Nevada	1,267,000	190,000	98,000	1,555,000
New Hampshire	487,000	73,000	98,000	658,000
New Jersey	1,321,000	198,000	389,000	1,908,000
New Mexico	1,588,000	238,000	168,000	1,994,000
New York	4,853,000	728,000	1,338,000	6,919,000
North Carolina	2,323,000	349,000	497,000	3,169,000
North Dakota	1,545,000	232,000	310,000	2,087,000
Ohio	3,594,000	539,000	835,000	4,968,000
Oklahoma	2,332,000	350,000	450,000	3,132,000
Oregon	1,631,000	245,000	226,000	2,102,000
Pennsylvania	4,207,000	631,000	1,131,000	5,969,000
Rhode Island	487,000	73,000	98,000	658,000
South Carolina	1,330,000	200,000	294,000	1,824,000
South Dakota	1,617,000	242,000	270,000	2,129,000
Tennessee	2,082,000	313,000	373,000	2,768,000
Texas	6,200,000	930,000	1,070,000	8,200,000
Utah	1,124,000	169,000	128,000	1,421,000
Vermont	487,000	73,000	98,000	658,000
Virginia	1,806,000	271,000	374,000	2,451,000
Washington	1,558,000	233,000	300,000	2,091,000
West Virginia	1,081,000	162,000	261,000	1,504,000
Wisconsin	2,412,000	362,000	488,000	3,262,000
Wyoming	1,243,000	187,000	133,000	1,563,000
Dist. of Col.	487,000	73,000	98,000	658,000
Hawaii	487,000	73,000	98,000	658,000
Puerto Rico	487,000	73,000	144,000	704,000
Adm. & Engr.	2,500,000	375,000	500,000	3,375,000
TOTALS	100,000,000	15,000,000	20,000,000	135,000,000

the Sacramento River Canyon about 12 miles north of Redding, Shasta County, Calif. It will be a gravity-section concrete dam, about 560 feet high and 3,500 feet long, with a slightly curved axis, an overflow spillway in the center, and a 350,000-kilowatt power plant flanking the base. It will back up the waters of three rivers—the Sacramento, Pit and McCloud—a distance of 35 miles to create a reservoir with a gross storage capacity of 4,500,000 acre-feet.

The bids just received are for performing all work, including furnishing labor and equipment, for construction of the dam and power plant. The bids do not include the supplying of materials which are to become a part of the completed structure. The Government will purchase under separate contracts such items as cement, structural and reinforcement steel, pipe, metalwork and machinery.

The contract work involves the excavation of over 3 million cubic yards of earth and rock to prepare the foundation; the manufacture and placement of more than 5½ million cubic yards of concrete, along with 26 million pounds of reinforcement steel, in the dam and powerhouse; compacting more than 1½ million cubic yards of earth and rock fills; installation of over 13 million pounds of large penstock and outlet pipes, about 8 million pounds of small tubing for cooling and grouting, almost 13 million pounds of steel gates and control mechanisms, and over 3 million pounds of trashrack steel.

All labor will be hired directly by the contractor, although it will be several months after the start of construction before the project reaches the stage of large-scale employment. Peak employment of several thousand workers probably will not be reached for about two years.

One of the contractor's first tasks will be to select a camp site and provide housing facilities for his large crew in the vicinity of the dam site. A Government camp for engineers, clerks, inspectors, surveyors and other Bureau of Reclamation employes and their families is nearing completion about three miles east of the dam site.

Shasta Dam will be the second largest concrete dam in the world, both as to height and mass. Its only rivals will be mighty Boulder Dam, completed by the Bureau on the Colorado River, and Grand Coulee Dam under construction by the Bureau on the Columbia River.

A comparison of the designed size of these three water conservation giants follows:

	Shasta Dam	Boulder Dam	Grand Coulee Dam
Height	560 feet	727 feet	553 feet
Crest length	3,500 feet	1,282 Feet	4,200 feet
Base thickness	580 feet	660 feet	520 feet
Concrete	5,610,000 cu. yds.	4,360,000 cu. yds.	10,250,000 cu. yds.

Second to Boulder in height and second to Grand Coulee in mass, Shasta Dam will be first in at least one respect—as the highest overflow type of dam in the world. Water falling over the 375-foot spillway in the center of Shasta Dam will have a drop of 480 feet, which is three times the height of Niagara Falls.

Massachusetts Penalized for Diversion

The Department of Agriculture has found that Massachusetts diverted State motor vehicle revenues to other than highway purposes in such manner as to make necessary the withholding of $472,862 of the Federal-aid apportionment of $3,171,423 for the fiscal year ending June 30, 1938.

This action is made mandatory by the Hayden-Cartwright Act of 1934 which requires that Federal-aid funds be withheld from any State using the proceeds of State motor-vehicle registration fees, gasoline taxes and other special taxes on motor-vehicle owners and operators for other than highway purposes in an amount greater than was being so used prior to June 18, 1934. The amount to be withheld may not exceed one-third of the apportionment for any fiscal year.

Massachusetts authorities were notified in October, 1937, that a study of the State's disposition of motor vehicle revenues disclosed an increased use for non-highway purposes subsequent to

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ESTIMATED APPORTIONMENTS OF FEDERAL AID HIGHWAYS AND GRADE CROSSING FUNDS FOR THE FISCAL YEAR 1941

STATE	Federal aid	Secondary or feeder	Grade Crossing	Total
Alabama	$ 2,380,000	$ 310,000	$ 592,000	$ 3,282,000
Arizona	1,637,000	214,000	190,000	2,041,000
Arkansas	1,952,000	254,000	519,000	2,725,000
California	4,333,000	565,000	1,096,000	5,994,000
Colorado	2,081,000	271,000	380,000	2,732,000
Connecticut	719,000	94,000	251,000	1,064,000
Delaware	560,000	73,000	146,000	779,000
Florida	1,528,000	199,000	416,000	2,143,000
Georgia	2,888,000	377,000	716,000	3,981,000
Idaho	1,409,000	184,000	243,000	1,836,000
Illinois	4,661,000	608,000	1,547,000	6,816,000
Indiana	2,803,000	365,000	762,000	3,930,000
Iowa	2,930,000	382,000	818,000	4,130,000
Kansas	3,007,000	392,000	763,000	4,162,000
Kentucky	2,104,000	274,000	537,000	2,915,000
Louisiana	1,639,000	214,000	467,000	2,320,000
Maine	997,000	130,000	203,000	1,330,000
Maryland	931,000	122,000	304,000	1,357,000
Massachusetts	1,577,000	206,000	613,000	2,396,000
Michigan	3,462,000	452,000	972,000	4,886,000
Minnesota	3,115,000	406,000	788,000	4,309,000
Mississippi	2,011,000	262,000	466,000	2,739,000
Missouri	3,456,000	451,000	898,000	4,805,000
Montana	2,340,000	305,000	392,000	3,037,000
Nebraska	2,362,000	308,000	523,000	3,193,000
Nevada	1,457,000	190,000	146,000	1,793,000
New Hampshire	560,000	73,000	146,000	779,000
New Jersey	1,519,000	198,000	584,000	2,301,000
New Mexico	1,826,000	238,000	251,000	2,315,000
New York	5,581,000	728,000	2,008,000	8,317,000
North Carolina	2,672,000	349,000	746,000	3,767,000
North Dakota	1,777,000	232,000	466,000	2,475,000
Ohio	4,133,000	539,000	1,252,000	5,924,000
Oklahoma	2,682,000	350,000	675,000	3,707,000
Oregon	1,876,000	245,000	340,000	2,461,000
Pennsylvania	4,838,000	631,000	1,696,000	7,165,000
Rhode Island	560,000	73,000	146,000	779,000
South Carolina	1,530,000	200,000	442,000	2,172,000
South Dakota	1,859,000	242,000	404,000	2,505,000
Tennessee	2,395,000	313,000	560,000	3,268,000
Texas	7,130,000	930,000	1,604,000	9,664,000
Utah	1,293,000	169,000	193,000	1,655,000
Vermont	560,000	73,000	146,000	779,000
Virginia	2,077,000	271,000	561,000	2,909,000
Washington	1,791,000	233,000	451,000	2,475,000
West Virginia	1,243,000	162,000	391,000	1,796,000
Wisconsin	2,774,000	362,000	733,000	3,869,000
Wyoming	1,430,000	187,000	199,000	1,816,000
Dist. of Col.	560,000	73,000	146,000	779,000
Hawaii	560,000	73,000	146,000	779,000
Puerto Rico	560,000	73,000	216,000	849,000
Adm. & Engr.	2,875,000	375,000	750,000	4,000,000
TOTALS	115,000,000	15,000,000	30,000,000	160,000,000

June 18, 1934. The State was called upon to show why a penalty should not be applied. A showing that could be accepted under the provisions of the law has not been made and the funds in question have not been restored for highway use.

Under similar circumstances $250,000 was deducted from the apportionment to New Jersey for the fiscal year 1937. Maryland, Pennsylvania and Georgia were found to have used motor vehicle revenues for non-highway purposes to such an extent as to require Federal action. Maryland and Pennsylvania have restored the required amounts to highway funds and no further action is to be taken. Georgia officials have given assurance that they will follow a similar course but have not yet done so.

1937 Gas Tax Collections

Gasoline taxes collected by the states last year hit a new record high of $756,930,000, a gain of $69,299,000 over 1936, and an increase of $498,091,000 during the past decade, reports the American Petroleum Industries Committee.

New York led the states with $61,841,000 in gasoline-tax collections in 1937, a gain of $6,206,000 over 1936. Pennsylvania was second with $55,711,000, followed by California, $46,614,000; Ohio, $46,538,000; Texas, $41,671,000, and Illinois, $35,836,000.

Since 1927 the average annual state gasoline-tax burden per motor vehicle in the United States has more than doubled. In 1927, when 23,133,000 motor vehicles were registered in the United States, $258,839,000 was collected in state gasoline taxes. In 1937 the number of motor vehicles had grown to 29,709,000, an increase of approximately 20 per cent over 1927, but state gasoline tax costs had increased by $489,091,000 to a total of $756,930,000, or nearly three times the amount collected a decade ago.

Besides paying state gasoline taxes, the nation's motorists paid an additional $203,025,000 in federal gasoline taxes in 1937.

1937 Motor Vehicle Registrations

Motor vehicle registrations in 1937 amounted to 29,705,220—an increase of more than 1,539,000 over the preceding year, according to State reports to the Bureau of Public Roads of the U. S. Department of Agriculture. There were registered 25,405,728 automobiles, 4,255,296 trucks, and 44,196 busses.

Registration receipts totaled $337,410,000. Other receipts for permits, certificates of title and from miscellaneous sources brought the total to $399,613,000. Additional payments to States by motor carriers, such as taxes on gross receipts, ton-miles, passenger-miles, and as special license fees and franchise taxes, amounted to $16,216,000.

New York registered the most vehicles, 2,453,542; California was second with 2,327,984.

Increases in registration of more than 8 per cent were reported in Arizona, Connecticut, Florida, Kentucky, Michigan, Mississippi, New Mexico, Oregon, and Utah. Increases of more than 100,000 were reported in California, Illinois, Michigan, New York and Pennsylvania.

According to the Bureau of Public Roads, highway usage increased not only because of the presence of a million and a half additional vehicles, but because of increased use per vehicle. This is indicated by an increase of 7.6 per cent in gasoline consumed as compared with a 5.5. per cent increase in registrations.

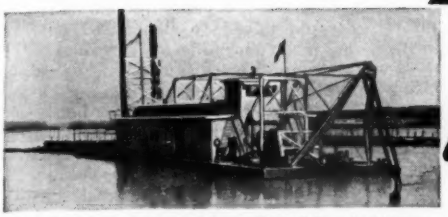
Lake Mead Two-Thirds Full

Storage in Lake Mead, the great lake created in the southwestern desert by Boulder Dam, has reached 20,000,000 acre-feet, and the lake is now two-thirds full.

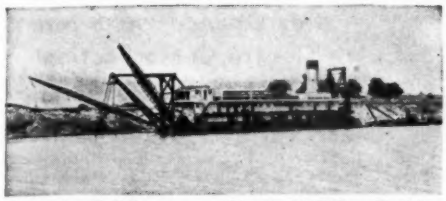
Where three years ago, only the sullen Colorado River flowed through its precipitous canyons over a series of rapids, Lake Mead now stretches upstream from the dam 112.8 miles, with a maximum depth of its waters of 505.90 feet.

A total of 6,517,011,000,000 gallons of water, which otherwise would have wasted into the sea, have been caught and stored in Lake Mead, thus regulating the river, and providing a reliable water supply for irrigators of 1,000,000 acres of land reclaimed from the deserts of Arizona and California; for domestic use by the cities served by the stream

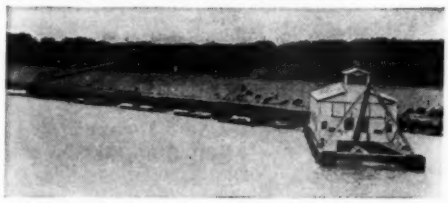
Turning Out Big Yardage



One of the four pipe-line dredges at Ft. Peck Dam, in Montana. Each is equipped with two G-E 2500-hp main-pump motors, a G-E 700-hp cutter motor, and G-E control and switchgear

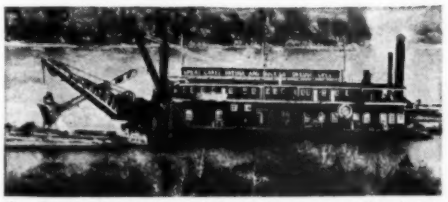


The dredge *Gulf Stream*, owned by the McWilliams Dredging Company, of Chicago and New Orleans. A G-E 4000-hp steam turbine drives the main pump, and a G-E 750-kw turbine-generator supplies current for the other operations



This 28-inch dust-pan dredge, equipped with G-E synchronous main motor and G-E variable-voltage auxiliary drives, operates in the Loup River Public Power and Irrigation District, Columbus, Nebraska.

The *Marshall C. Harris*, a 27-inch suction dredge owned by the American Dredging Company, of San Francisco and Oakland. Speed of the main pump is controlled by the money-saving G-E Scherbius system of control



The Great Lakes Dredge and Dock Company uses this diesel-electric dredge, *Crest*, in the Atlantic Division of the company on all kinds of heavy dredging. The motors and generators with variable-voltage control are General Electric

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Take the four dredges at Ft. Peck, for example. During the 1937 working season, of 249 days, they pumped 31,672,400 yards of material into the earth-fill dam. That's maintaining an average of 5,900 cubic yards per hour.

As a result of this fast rate, the earthwork will easily be finished during the 1938 working season—a year ahead of schedule!

On all sorts of construction projects you'll find that the correct electric equipment will help you get the speed that cuts time schedules. For any type of electric equipment, just call the nearest G-E office. General Electric Company, Schenectady, New York.

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in those States; and to turn the great turbines in the powerhouse at the toe of the dam.

The water stored in Lake Mead would provide 51,100 gallons of water for every man, woman and child in the United States, approximately the average used in a year for domestic purposes.

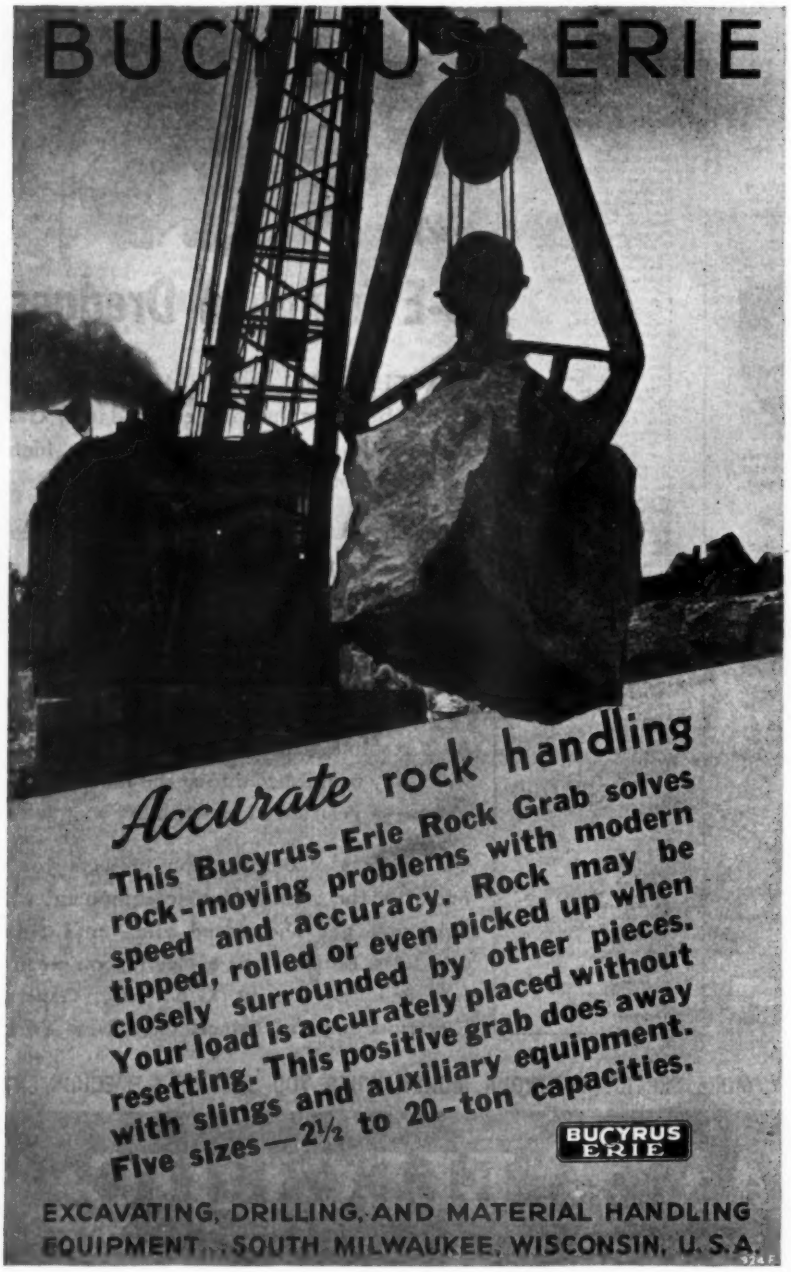
The lake covers 107,860 acres and extends from Boulder Dam in Black Canyon through Boulder Canyon, Travertine, and Iceberg Canyons and into the lower and previously unvisited end of Grand Canyon.

The maximum water elevation is 60 feet below the lips of the spillways. However, 7,189,000 acre-feet of additional water will be required to cause the lake to spill.

Almost 5,000,000 acre-feet of water has been added to the total stored in Lake Mead this year. The river is flowing at a rate of about 200,000 acre-feet a day at the point where it enters Lake Mead, and about 20,000 acre-feet a day are being released through the turbines to the irrigators and other water users downstream.

During May, Lake Mead rose until it covered the Lava Cliff Rapids, one of the many treacherous stretches of water recorded by the few intrepid explorers who had successfully threaded the Colorado River canyons before the construction of Boulder Dam. Other rapids will be flooded before the reservoir fills. Included among these are 241-Mile Rapids, 240-Mile Rapids, Separation Rapids, 236-Mile Rapids, Gneiss Canyon Rapids, and Bridge Canyon Rapids.

Where a few years ago only the most intrepid dared to penetrate, some of the most magnificent canyons of the Colorado River can now be entered safely by boat on the blue waters of Lake Mead. In May, more than 21,000 persons, out of 47,000 who visited Boulder Dam, made short or long trips on Lake Mead and used the beach which it has created in the old Hemenway Wash, which, a few years ago, was a blistering stretch of sand.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EXCAVATING, DRILLING, AND MATERIAL HANDLING EQUIPMENT . . . SOUTH MILWAUKEE, WISCONSIN, U.S.A.

Bids Opened On 8-Mile Contra Costa Section

Seventeen bids for construction of the next eight miles of the Contra Costa Canal were opened by the United States Bureau of Reclamation at the Central Valley Project office in Sacramento. Pearson, Minnis & Moody, and Werner & Webb, of Los Angeles, was the low bidder for the entire job with a tender of $340,992.20.

The work, for which contract will be awarded by the Secretary of the Interior after consideration of all bids, will involve the excavation of 515,000 cubic yards of earth and rock, the placement of 16,255 cubic yards of concrete, and the installation of more than 1,000,000 pounds of reinforcement steel. The successful bidder will be given 450 days—about a year and three months—to complete the job. Labor will be hired directly by the contractor.

This eight miles will be the first section of the Contra Costa Canal to be concrete-lined. The initial four-mile section, a broad earth ditch extending from Rock Slough of the San Joaquin River to Oakley, is now 80 per cent constructed, it was announced by Walker R. Young, construction engineer. Work is about completed on the Burroughs Slough siphon, the last of four reinforced concrete siphons to be built in the first four-mile section under contract to Haas, Doughty & Jones and Marshall & Stacy, of San Francisco.

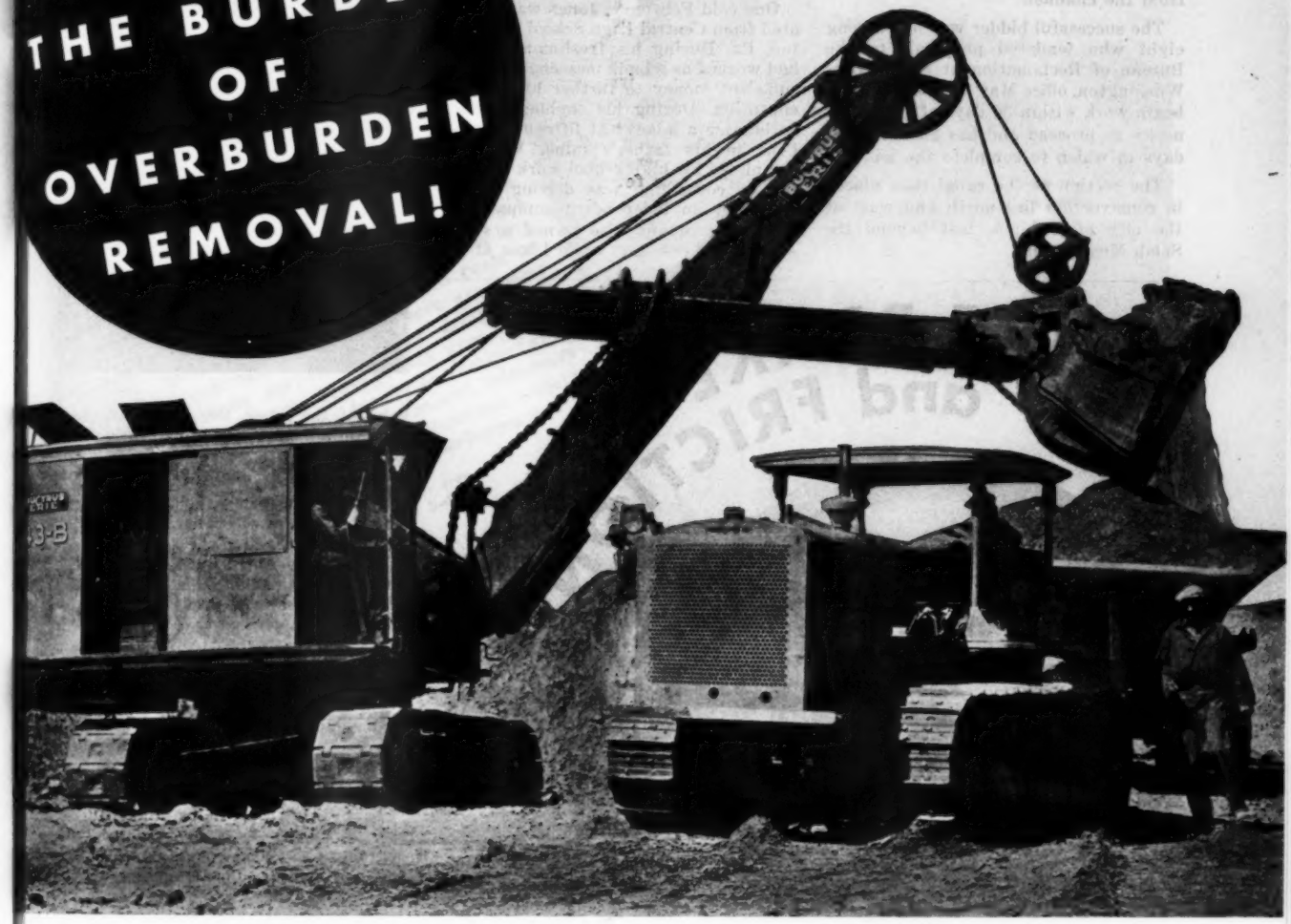
Seven more siphons, five highway bridges and a 1360-foot tunnel are among the structures included in the eight miles from Oakley to near Antioch. The canal ultimately will extend a total distance of 46 miles to Martinez.

2½-Mile Yakima Ridge Award

The contract for excavating an additional section, a little more than 2½ miles long, of the Yakima Ridge Canal, the artery through which water will flow for the new Roza Division of the Yakima (Washington) project, was awarded recently to Haas, Doughty & Jones and Marshall & Stacy of San Francisco, California, on their bid of $140,293.50.

The contract covers an addition to the

EASING THE BURDEN OF OVERBURDEN REMOVAL!



HERE, on the Iron Range, is a practical demonstration that *savings add up fast*—when various units of "Caterpillar" Diesel equipment work in co-operation! To remove the overburden, shown in this picture, the owner sent in *two* pieces . . . a "Caterpillar" D8 Tractor with an Athey wagon, and a "Caterpillar" Diesel Engine in the Bucyrus-Erie shovel.

Let's, for a moment, consider just one phase of the operation. By hauling heaping loads at a steady pace—in spite of mud, rocks, and difficult going—the tractor *saves considerable time* through its ample power and sure-footed tracks.

Back at the shovel, there are two ways that time could be lost. First of all, there's the matter of spotting the wagon. But the tractor takes care of that, itself, by its quick and easy responsiveness!

So . . . it's up to the shovel not to let the time that's been gained slip out of hand. And the "Caterpillar" Diesel Engine rises to the situation. With strong, steady lugging ability, to take the overload over the "hump," there's *no* time-wasting pick-up here!

Yet it's not only by saving valuable minutes that "Caterpillar" Diesel equipment eases up mining-costs, all around the world. Added to that is an economical use of economical fuel . . . outstanding freedom from repairs . . . long life . . . low up-keep . . . and a further saving of time through a ready, nearby source of service and parts when they're needed!

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excavation of the canal, construction of highway bridges across the canal, some concrete lining and some lining with compacted earth to prevent seepage from the channel.

The successful bidder was low among eight who tendered proposals to the Bureau of Reclamation at its Yakima, Washington, office May 9, 1938. He must begin work within 30 days of receipt of notice to proceed and has 250 calendar days in which to complete the job.

The section of the canal thus placed in construction lies north and west of the city of Yakima, just beyond the Selah-Moxee Canal.

Steam Shovel to Stardom

Thanks to a steam shovel, Allan Jones became a singer. And the steam shovel eventually led to Hollywood.

One cold February, Jones was graduated from Central High School in Scranton, Pa. During his freshman year he had worked as a bank messenger to earn sufficient money to further his musical education. During his sophomore year he became a laborer at fifteen cents an hour in his father's mine. When he completed his high school work the best job he could find was driving a coal truck for an independent company.

"That company also owned a steam shovel, and one day, while I was at the

helm of the truck, the shovel engineer went on a bat," Allan now recalls. "The boss was frantic, for there was a lot of work for the shovel.

"In the emergency, I jumped up and loaded two cars of coal that day, which was even better than the regular steam-shovel engineer had done. So I got the job at seventy-five dollars a week. I worked ten hours a day until the summer months, when the company went broke and I returned to the mines as a laborer, but even as boss of a 'floating gang' I was earning only one-fifth as much as on the shovel. So I started on a double shift, sixteen hours a day, and with the money I had already saved from that shovel job, I put $1500 in the bank that fall."

That $1500 gave Jones the courage to step out of the mines and begin a course at Syracuse University music school. Eventual concert engagements led to positions as church soloist in New York, to orchestral engagements and light opera and thence to films. Most recently seen on the screen in Metro-Goldwyn-Mayer's musical, "Everybody Sing," he has just completed a highly successful personal appearance tour of the East and Middle West, and will be seen shortly in the male lead of another film musical.

His hardest job, while driving to and from work, is to avoid stopping to watch construction projects, he confesses. If there's a steam shovel within hailing distance, he's always seized with that urge to jump into the cab and grab the controls.

Air Hygiene Election

Fifteen representatives of industry, science and government, were elected to the Board of Trustees of Air Hygiene Foundation at the annual business meeting held at Mellon Institute, Pittsburgh, recently. The Foundation is a non-profit, cooperative organization for the advancement of industrial health.

H. B. Meller, Managing Director, an-

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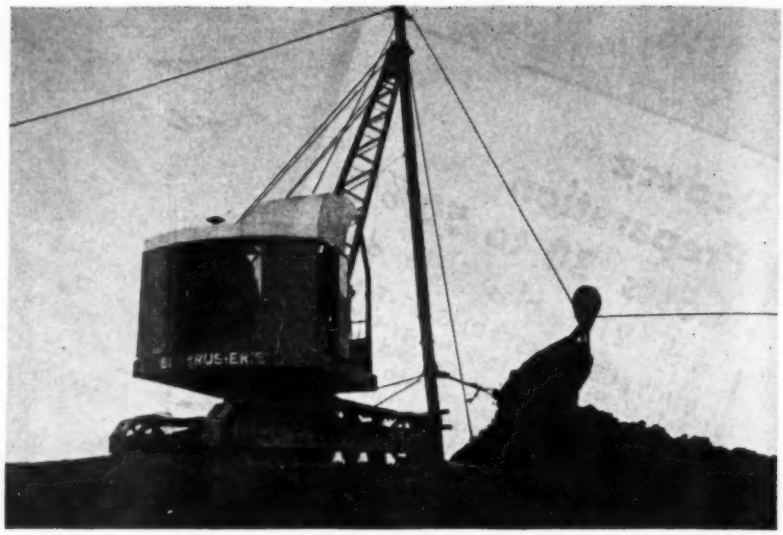
nounced in his annual report that 200 industrial concerns are now supporting the Foundation's research and studies for the prevention of occupational diseases. Meller said this basic work, "of vital human and economic import," is progressing at several research centers, including The Saranac Laboratory, The Moore School X-Ray Laboratory at the University of Pennsylvania, and at Mellen Institute. He reported:

"Aside from the intense human benefits involved, industrial health pays practical dollar-and-cents dividends to employers, employees, and to the community. It means (1) increased production; (2) increased efficiency and less absenteeism; (3) fewer compensation claims and damage suits; (4) improvement in home and community life, curtailing public welfare costs, and (5) better employer-employee relations and increased public good will."

Novel Use for ⅜-yard Excavator

Cleaning stock tanks in the Davis Mountains near Alpine, Texas, J. S. Davis uses his ⅜-yard, 10-B rig as a slackline excavator. Coconut Ranch, on which the work is being done, consists of 600 sections of 640 acres each. A total of about 30,000 yards has to be handled at this ranch in the tank cleaning.



• J. S. Davis uses his ⅜-yard rig as a slackline excavator and moves 80 yards an hour in cleaning stock tanks on a large Texas ranch.

As shown in the accompanying picture, the 10-B's dragline boom is fixed to a 25-foot gin pole braced by guy wires. The cableway used is about 225 feet long. The rig is moving an average of 80 yards of material per hour.

After the material is dumped on the levee on which the machine works, it is washed down by a centrifugal pump and wasted on the other side of the levee. A slackline bucket system such as this is the only way these large ponds can be satisfactorily cleaned.

"Poor ole Bill! 'E's so short-sighted 'e's working 'himself to death."

"Wot's 'is short sight got to do with it?"

"Well, 'e can't see when the boss ain't looking, so 'e 'as to keep on shoveling all the time!"

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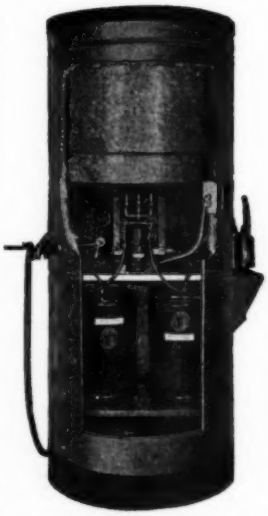

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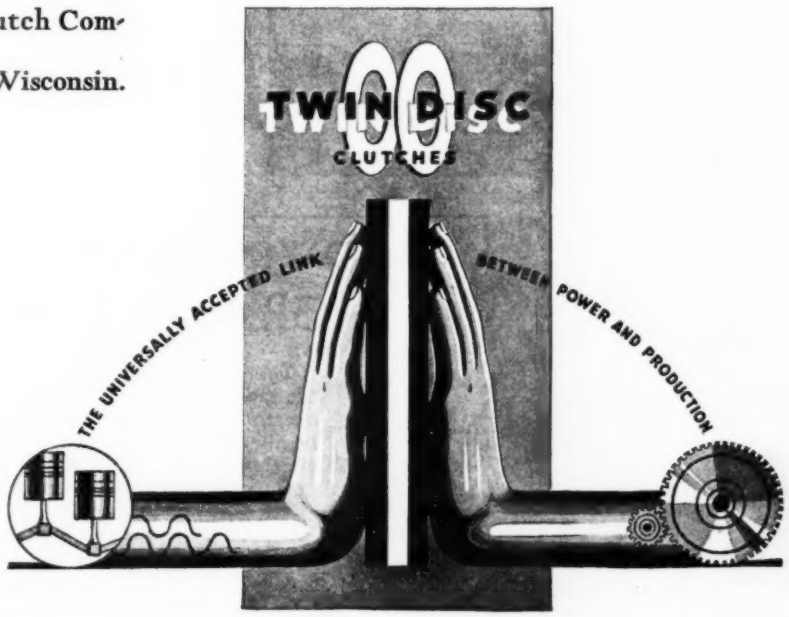

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Equipment You Ought to Know About

(Continued from page 380)

Dual Drum Paver

The Ransome Concrete Machinery Company, general works Dunellen, New Jersey, has devised the 27-E "Dual Drum" Paver with two mixing compartments in one drum.

While the increased output, reported by the manufacturers, requires more trucks, more feet of forms, and more fine grading prepared—it does not require any change in the contractor's present batcher plant, batch trucks, batch boxes, etc., as already set up for a 27-E Single Drum Paver. The same trucks that handle the 27-E Single Drum Paver batches can also be used for the Ransome 27-E "Dual Drum" Paver, thus eliminating the necessity of changing weight settings.

New Type Respirator

Development of a new type respirator which will prevent silicosis, if worn faithfully, has just been announced from the laboratories of American Optical Company.

Silicosis, an incurable lung disease, is caused by breathing silica dust, and the respirator was developed for men engaged in mining, tunneling, drilling, quarrying, and the processing of mineral products containing silica; in fact, all industrial workers exposed to the silica dust hazard.

Earth Mover Tire

The U. S. Rubber Company announces a new U. S. Royal Earth Mover Tire, especially engineered for vehicles of the "buggy" or towed type. Manufacturers claim the new Royal Earth Mover tread pattern offers minimum rolling resistance and complete control of side slips under the most adverse conditions. Eleven rows of blocks, instead of the conventional five rows, extend well up the sidewalls of the tire, bringing into play more than twice the gripping area of the conventional tread.

Crushing Plant

A new crushing plant, model 48-V, has been designed and constructed by the Pioneer Engineering Works, 1515 Central Avenue, Minneapolis, Minnesota. The manufacturers describe it as the super plant for a big job.

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GRAPPLE and BUCKET

This unit embodies an entirely new mechanical principle in the independent action of each jaw. The jaw meeting the least resistance penetrates deeply into the material and anchors, to be likewise followed by the other jaws. This results in greater efficiency and more profitable operation when used as a rock grapple or an orange peel bucket.

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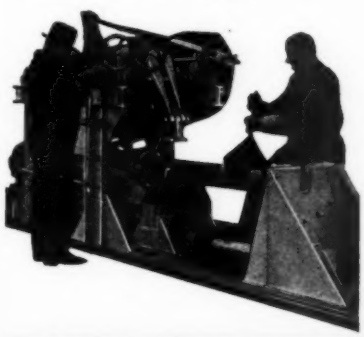
FASTER DRILLING

IN PLACE of the limited footage you obtain with the old style hand-dressed bits in hard rock blast-hole drilling, you can get 30 to 50% faster drilling with modern Bucyrus-Armstrong Type "G" bits. Sharpened on a Bucyrus-Armstrong mechanical bit dresser, Type "G" bits have many unexcelled high-production features:

1. **A sharp penetrating edge, deeply concave in shape, combined with a concave crushing face, produces better chipping, increased pulverization, faster drilling.**
2. **Fully developed reaming edges cut the hole round and smooth.**
3. **Deep, wide water-courses assure maximum mixing of the sludge and keep pulverized material in suspension.**
4. **The Type "G" bit may be sharpened either to provide maximum wearing surface (for abrasive materials) or with no wearing surface (for soft limestone or shale).**
5. **The cutting edge is made longer and sharper to improve angle of penetration and resist wear in hard rock formations.**

For fast penetration, efficient crushing, mixing and reaming, and for freedom from stuck bit troubles, standardize on Type "G" bits, sharpened on a Bucyrus-Armstrong bit dresser. Write for full particulars about these money-saving aids to modern blast-hole drilling.



BUCYRUS-ARMSTRONG BIT DRESSERS

For increased bit efficiency and lower sharpening costs, use a Bucyrus-Armstrong mechanical bit dresser, No. 8 or No. 12. Illustrated at left is No. 12 for 5 to 12-inch bits.

M 2

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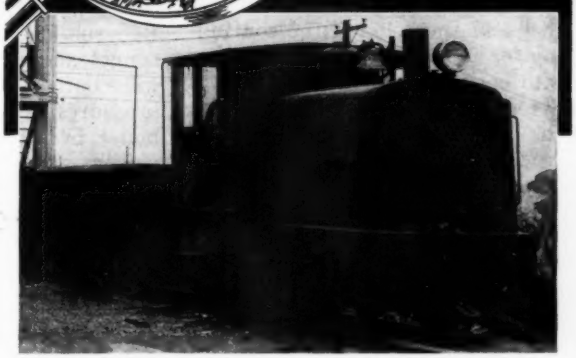
IS AN EFFICIENT DIRT MOVER WITHIN ITS CAPACITY



It takes a lot of ants to move a handful of dirt, and they only work in fair weather. A Whitcomb Locomotive has many advantages over ground-contact haulage equipment. It is not handicapped by slippery, rained-out roads. Its power is augmented by a smooth roadway of steel rails. One man hauls many loads at a time with economy and dispatch.

Cut your haulage costs by the extra years of service that a Whitcomb Locomotive provides, and you'll discover a new source of profit. Whitcomb experience in building industrial locomotives, plus Baldwin resources, assure you the finest in locomotive design, performance and economy.

Our engineers are available for a survey of your haulage requirements without obligating you.

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WHITCOMB LOCOMOTIVES

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Sixth Avenue Subway

(Continued from page 373)

express service at Thirty-fourth Street. At forty-first Street the line shaves the roof of the I.R.T. Queens Subway and a block north has to cut below the four-track I.R.T. Shuttle running between the Grand Central and Times Square districts. Clearance is zero and the old shuttle floor must be altered.

At Forty-third Street two rock tunnels accommodate all tracks, one leaving after travelling 320 feet and the other three continuing for another 300 feet, emerging into open cuts. From Forty-ninth Street connections are made with the existing Fifty-third Street tracks by means of an involved flexing arrangement.

Between Ninth and Fifty-third Streets geological conditions are bad throughout. As far as Thirteenth Street, sand and clay are encountered with small amounts of water, for the most part. North of Twentieth Street, except for one fault, subgrade is below rock at all points. Rock occurs at different elevations along the route and on opposite sides of the street, usually. For the greater part it is Manhattan schist of variable hardness, badly twisted and faulted. Even that which appears to be in good condition when opened up is apt to disintegrate rapidly on exposure to the air.

The general method of providing for the load of the Sixth Avenue Elevated structure before excavating beneath its supports is to pick up its columns on needle beams and transfer their load to concrete piers which have been sunk to subgrade or rock. These piers extend down through the subway structure and its roof is built around them. When the subway is completed the Elevated load will be transferred to the subway roof and that part of the piers within the subway will then be demolished and the fragments used for backfill underneath passenger platforms, or wherever else needed.

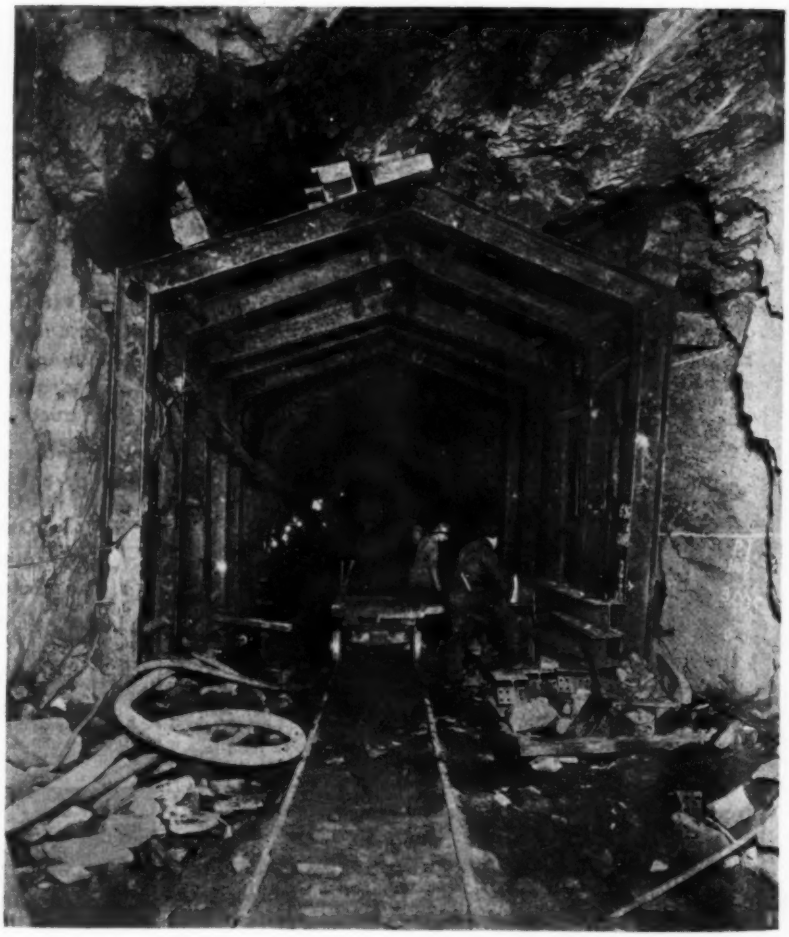
The George H. Flinn contract extends from Forty-seventh Street to the north end of the line. It is in cut and cover except for stub tunnels driven to make connections with the Fifty-third Street tracks and a new 230 foot tunnel driven for the same reason. In blasting operations Dupont 40% gelatin was employed.

Below the street surface two Bucyrus-Erie five-eighth yard tunnel shovels were used. These were both air operated at throttle pressures of 112 lbs. Compressor house pressure was 118 lbs. and power was transmitted through four and six inch lines up to 1,500 feet in length. One of these shovels was located in a cut-and-cover section, handling rock and dirt; the other loaded skips in the tunnel where rock only was encountered and output was about 120 yards per shift.

Personnel

Jesse B. Snow is chief engineer, and C. E. Conover is chief designing engineer for the New York City Board of Transportation. Construction operations are under the direction of Byron Houghtaling, division construction engineer; A. E. Clark, assistant division engineer; and Messrs. Dixon, Madden, Ahearn, Miller, Taylor, and Breitenberger, section engineers.

For the George H. Flinn Corporation, R. Frank Lee is general superintendent and Julius H. Serra resident engineer. For Spencer, White & Prentiss Inc., H. M. Hale is managing engineer, H. Pagliari is general superintendent, and H. Talbot is tunnel superintendent.



• Steel frame supports were used in this single-track rock tunnel section between Forty-third and Forty-fourth Streets.

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BUCYRUS ERIE

Trade notes

Bucyrus-Erie Company, South Milwaukee, Wisconsin, announces the appointment of Howard Steiner Equipment Sales, East 4th Street (P.O. Box 471), Reno, Nevada, as distributor in northern Nevada. The Howard Steiner organization will handle the sale of Bucyrus-Erie shovels, draglines, clamshells, and lifting cranes, ranging from ⅜-yard to 2-yards in size, and will work with the cooperation of the Bucyrus-Erie branch office, 390 Bayshore Blvd., San Francisco, California.

The Timken Roller Bearing Company announces the appointment of David T. Marvel as Manager of Tube Sales. He will have full charge of the sale of all forms of Timken Seamless Steel Tubing. His headquarters will be at the main office in Canton, Ohio.

The Easton Car and Construction Company has moved its New York office to Hudson Terminal, 50 Church Street. The office is under the management of Alfred L. Schuller.

Bode-Finn Equipment Company, Inc., 1654 Central Avenue, Cincinnati, Ohio, has been appointed distributor in southern Ohio by Bucyrus-Erie Company, South Milwaukee, Wisconsin. Bucyrus-Erie shovels, draglines, clamshells, and lifting cranes, ranging from ⅜ to 2-yard sizes, will be sold by the Bode-Finn Equipment Company, Inc.

This new distributor will work with the cooperation of the Bucyrus-Erie branch office, 1502-03 Clark Building, Pittsburgh, Pennsylvania.

The Sullivan Machinery Company, makers of Air and Gas Compressors, Core Drills, Oil Field Drills, Oil Well Pumps, Rock Drills, Hoists and Coal Mining Machinery are moving their general offices from 307 North Michigan Avenue, Chicago, Illinois, to Michigan City, Indiana. The Chicago Sales Office will remain at the Chicago address.

Book reviews

Mabel Potter Hanford in her new book, "Advertising and Selling Through Business Publications," outlines the place of the business paper in the selling sun. Because her book is the first in its field, she has told as complete a "horizontal" story as possible, covering the range of her subject adequately, without attempting to plumb the depths of its various aspects.

A booklet describing earth moving in all parts of the world and under all types of climatic and soil conditions has been issued by Caterpillar Tractor Company. Airport work, road construction, road maintenance, railways, reservoirs, and general construction work are alloted separate divisions in the booklet. Copies of the booklet, which is entitled "Earthmoving Through The World," may be obtained by writing Caterpillar Tractor Company, Peoria, Illinois.

The Sullivan Machinery Company has released literature descriptive of a new revolutionary type of core drilling bit known as the Koebelite Korbit. In terms of bit cost per foot of hole drilled, savings of 15 to 20% are claimed in comparison with any other type of bortz set core drill bit. Faster drilling speed and greater footage per bit are also claimed.

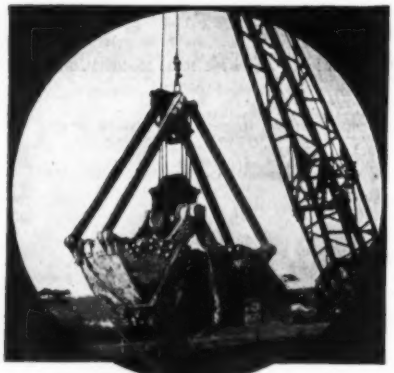
A new bulletin has been published which illustrates and describes the complete line of construction equipment which the Chain Belt Company manufactures for the contracting industry. Among this equipment is the Rex 160 Pumpcrete, "the pump that pumps concrete," which is now offered to the contractor whose jobs are usually less than five thousand cubic yards.

A new catalog, entitled "How to Join and Repair Pipe the Quick, Easy, Permanent Way," has been released by the S. R. Dresser Manufacturing Company, Bradford, Pennsylvania. The use of "before and after" pictures illustrate the function of the product. Readers may obtain their copies by writing the manufacturer.

The Harnischfeger Corporation of Milwaukee, manufacturers of P&H-Hansen Welders, announces Bulletin R-5 which gives complete and specialized information and data on each of the many Smootharc Welding Electrodes. A manual of welding electrode information, this bulletin includes spar tests, procedure sheets and many other informative suggestions to make it a valuable reference book for all welder users and operators. Copies may be obtained by writing the Harnischfeger Corporation, Milwaukee, Wisconsin.

Two bulletins have been published by the Precision Scientific Company, 1736 N. Springfield Avenue, Chicago, Illinois. Bulletin 221 is devoted to testing cement, concrete, lime, gypsum and soils and includes detailed information on U. S. Standard sieves and screens. Bulletin 222 shows U. S. Standard sieves as specified by the American Society for Testing Materials, American Association of State Highway Officials, and U. S. Government Highway Departments. It also lists various other types of sieves and screens for grading sand, stone and soil.

A recent Goulds Bulletin No. 210 gives complete details, data tables and information on a new line of single stage, side suction, ball bearing centrifugal pumps manufactured by Goulds Pumps, Inc., Seneca Falls, New York. There are eighteen sizes with capacities from 5 to 1,800 GPM against heads up to 110 ft. for flat or V-belt or direct motor drive.



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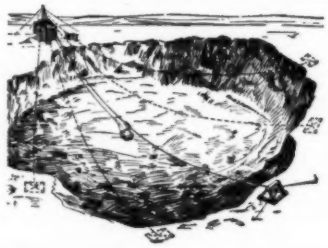

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BUCYRUS-ERIE 10-B Gasoline Shovel—dragline—clamshell, including drag bucket. Electric starter. Machine shop reconditioned. New machine guarantee. Located vicinity Chicago. Box 2154-SS.

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½-YARD

BUCYRUS-ERIE — TYPE A. ½-yard steam shovel. Cat mounted. 26' boom clamshell equipment. Located Central Illinois. Box 2007-SS.

MEAD MORRISON ½-yard Gas Shovel and 35' boom dragline including ½-yd. Page drag bucket. Good operating condition. Located Minnesota. Box 2081-SS.

P & H—MODEL 300—½-yard gasoline shovel. Reconditioned. Located Kentucky. Box 1107-SS.

⅝-YARD

BUCYRUS-ERIE 19-B Gasoline combination ⅝-yd. shovel and 45' boom clamshell and dragline including ½-yd. AX drag bucket. Hercules engine. Electric starter. Approximately 1 year old. Excellent condition. Located Connecticut. Box 2116-SS.

BYERS MODEL 128. ⅝-yd. gas shovel and 35' boom dragline, including ½-yd. Page "C" drag bucket. 4-cylinder Diamond T engine. Engine overhauled 1937. Good operating condition. Located Illinois. Box 2087-SS.

GENERAL—⅝-yd. Gas shovel. Cood condition. Located Eastern Pennsylvania. Box-2104-SS.

¾-YARD

BUCYRUS-ERIE TYPE B ¾-yd. Caterpillar mounted steam shovel. Located Massachusetts. Box 2123-SS

BUCYRUS-ERIE TYPE B Steam Shovel. ¾-yard Quarry dipper. Cat mounted. New boiler installed late 1935. Good operating condition. Located Georgia. Box 2073-SS.

BUCYRUS-ERIE — TYPE B. ¾-yard steam shovel and 40' boom clamshell. Cat. mounted. Located Buffalo, New York. Box 2005-SS.

BUCYRUS-ERIE—TYPE B ¾ YD. Caterpillar mounted Extra high-lift steam shovel. Located Chicago. Good working order. Will rent or sell. Box 1100-SS.

BUCYRUS-ERIE TYPE B steam ¾-yard shovel and 36' boom clamshell including ¾-yard Williams clamshell bucket. Located Central New York. Box 1188-SS.

LORAIN MODEL 40—¾-yd. Gas shovel. 16 mo. old. Excellent condition. Located Eastern Pennsylvania. Box 2103-SS.

NORTHWEST MODEL 105 Combination shovel and clamshell. 24' shovel boom. 17½' dipper handle. ¾-yard dipper. 40' clamshell boom. Type "C" Lakewood 1-yard clamshell bucket. Twin City gasoline engine. Reasonably good condition. Located near Chicago. Box 2045-SS.

OSGOOD. COMMANDER. Combination shovel, dragline and clamshell. ¾-yard Rock Type dipper. 35' dragline and clamshell boom. ¾-yard Page drag bucket. Hercules 6-cylinder 4⅛"x4½" engine. Completely rebuilt recently and new engine installed. Bucket very good. Will sell on terms. Located Texas. Box 2038-SS.

⅞-YARD

BUCYRUS-ERIE B-2. Extra High Lift shovel. 21'3" boom. 18'4" dipper handle. ⅞-yard dipper. Well cared for. Good condition. Located Rhode Island. Box 2047-SS.

BUCYRUS-ERIE B-2 High Lift Steam Shovel. Single Shaft Cat. Exceptionally good condition. Located Connecticut. Box 2078-SS.

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BUCYRUS-ERIE B-2. Extra High Lift steam shovel. 21'3" boom. 18'4" dipper handle. ⅞-yard dipper. Cat. mounted. Fair working condition. Located Chicago. Box 2039-SS.

BUCYRUS-ERIE—1035 GASOLINE SHOVEL. Chain Crowd. ⅞-yard Dipper. 26-in. caterpillar treads. Electric starter. Needs some repairs. Located vicinity Boston. Box 1065-SS.

BUCYRUS-ERIE—B-2—HIGH LIFT Caterpillar Mounted Steam Shovel. Good Operating condition. Located Eastern Pennsylvania. Box 1019-SS.

BUCYRUS-ERIE TYPE B-2, ⅞-YARD high lift steam shovel. Located Lawrence, Mass. Box 1090-SS.

BUCYRUS-ERIE—B-2—HIGH LIFT STEAM shovel. 21'3" boom, 16' dipper handle, ⅞-yard dipper. Single shaft caterpillar. Located Vermont. Box 1135-SS.

1-YARD

BUCYRUS-ERIE GA-2 1-yard shovel. Factory rebuilt 1934. Waukesha 4 cylinder 6¼"x8" engine. Good operating condition. Located Philadelphia. Box 2125-SS

BUCYRUS-ERIE 32-B—Gasoline chain crowd 1-yard shovel. Electric starter. Single shaft cats. Wisconsin 6-cylinder 5"x6" engine. Few minor repairs needed. Otherwise excellent condition. Located near Boston. Box 2061-SS.

BUCYRUS-ERIE—D-2 1 yard Diesel Shovel. Atlas engine. Field reconditioned. Located North Carolina. Box 1079-SS.

BUCYRUS-ERIE 1030 — ELECTRIC TUNNEL shovel. Boom 10 ft. 7 in. Dipper handle 10 ft. 5 in. 1-yd. dipper. Boom hoist 5 ft. 6 in. rear end clearance. 2 motor—power supply 3 phase, 60 cycle, 440 volt. Located Virginia. Box 1068-SS.

BUCYRUS-ERIE 31-B — 1 YARD STEAM shovel. Located Lawrence, Mass. Make an offer. Box 1092-SS.

BUCYRUS-ERIE 31-B — 1 YARD STEAM SHOVEL. Located Tennessee. Box 1093-SS.

BUCYRUS-ERIE — GA-2 — GAS-AIR — extra high lift shovel, 24' boom, 16' dipper handle, 1-yard dipper. Air starter. Mass. air tanks. Single shaft caterpillar. Located Massachusetts. Box 1121-SS.

BUCYRUS-ERIE—31-B STEAM SHOVEL. 22' boom, 15' dipper handle, 1-yard dipper. Now operating, can be demonstrated. Located Alabama. Box 1130-SS.

BUCYRUS-ERIE—30-B Electric Shovel. Suitable for power supply. 3 Phase, 60 Cycle, 440 Volt. Machine equipped with 3 motors. Said to be in first class operating condition. Located New Jersey. Box 1162-SS

LORAIN—MODEL 60—1-YARD shovel. Located Southern Virginia. Box 1182-SS

MARION MODEL 7, 1-yard steam shovel. Has not operated in the past five years. New flues recently installed in boiler. Located Buffalo, New York. Box 2006-SS.

NORTHWEST — MODEL 105 — GASOLINE shovel and clamshell—1-yard. Located Massachusetts. Box 1123-SS.

P&H MODEL 600 1-yd. Gasoline shovel. Waukesha engine. Crane equipment also available. Good condition. Located Connecticut. Box 2113-SS

P&H MODEL 600A Gas 1-yard Shovel and 40' boom crane. Electric starter and lights. Waukesha 4 cylinder 6"x7" Model J. L. engine. $1500 recently spent overhauling. Good condition and appearance. Located Central Wisconsin. Box 2084-SS.

P. & H. MODEL 600—1-YARD GAS SHOVEL and 40' boom clamshell. Waukesha JL-6"x7" Engine. Located North Carolina. Box 1095-SS.

1¼-YARD

BUCYRUS-ERIE GA-2 Gas-Air 1¼-yard shovel. Single shaft cat. Waukesha 4-cylinder 6¼"x8" engine. Located Wisconsin. Box 2161-SS.

BUCYRUS-ERIE GA-3 Gas-Air 1¼ yard shovel. Single shaft cat. Electric starter. Waukesha 4-cylinder 6¼"x8" engine. First class condition. Located near St. Louis. Box 2162-SS.

BUCYRUS-ERIE 34-B Diesel Chain crowd shovel. Special 1½-yd. dipper. Caterpillar Diesel D-11,000 6 cylinder 5¼"x8" engine. 30" cat. treads. Wired for electric lights. Excellent condition. Located Chicago. Box 2129-SS

BUCYRUS-ERIE GA-2 Gas-Air shovel. Single shaft cat. Waukesha 6¼"x8" 4-cylinder engine. $3,000 repairs added June 1937. Excellent condition. Located Kansas. Box 2126-SS

BUCYRUS-ERIE GA-2 Gas-Air 1¼-yd. shovel. Waukesha 6¼"x8" 4-cylinder engine. Electric starter. Some spare parts available. Good operating condition. Located Eastern Pennsylvania. Box 2124-SS

BUCYRUS-ERIE GA-3 Gas Air 1¼-yd. shovel. Waukesha 4-cylinder 6¾"x8" engine. Good operating condition. Now operating Arizona. Box 2090-SS.

BUCYRUS-ERIE GA-2 Gas-Air 1¼-yd. shovel. Waukesha 6½"x8" engine. Single shaft cat. General appearance and condition good. Located North Carolina. Box 2108-SS.

BUCYRUS-ERIE. GA-2, Gas-Air. 1¼-yard shovel. Electric starter. Waukesha W.L. 4-cylinder 6¼"x8" engine. Single shaft cat. Extensively repaired recently. Located Texas. Box 2030-SS.

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BUCYRUS-ERIE E-2 shovel and dragline. 1½-yard Plate dipper. 45' boom plus 10' extension. 1¼-yard Page drag bucket. Electric light plant. Atlas Diesel engine. Engine overhauled since last used. Balance of machine good operating condition, except minor repairs needed. Located Louisiana. Box 2053-SS.

TWO—BUCYRUS-ERIE—GA-3, GAS-AIR 1¼-yard shovels, Wisconsin D-2—6 cyl. 5¼"x6½" Engines. Good condition. St. Paul, Minnesota. Box 1097-SS.

BUCYRUS-ERIE 41-B — 1¼-YARD STEAM SHOVEL. Located near Boston. Electric light plant. Very good price. Box 1096-SS.

BUCYRUS-ERIE—41-B—STEAM SHOVEL. 21' boom, 15' dipper handle, 1¼-cubic yard dipper. Now operating. Will demonstrate. Located Alabama. Box 1131-SS.

BUCYRUS-ERIE GA-3—Gas-Air 1¼-yard high lift shovel and 45' boom clamshell machine. Electric starter. Single shaft cat. Waukesha 4-cylinder 6¼"x8" engine. Few minor repairs needed. Otherwise excellent condition. Located New Jersey. Box 2058-SS.

KOEHRING MODEL 501 1¼ yard gas shovel. Located New Mexico. Box 2148-SS.

LIMA MODEL 101. 1¼-yard gas shovel. 50' boom dragline. Excellent condition. Located Texas. Box 2029-SS.

2—LIMA MODEL 101. 1¼-yard gasoline shovels. 26' boom. 17' dipper handle. Waukesha Model J. K. 6½"x7" engine. Recently rebuilt. Excellent condition. Located Texas. Box 2042-SS.

LORAIN 75-A 1¼-yd. Gas shovel. Good operating condition. Located near Boston. Box 2118-SS

2 MARION Model 450—Steam Shovels. Good condition. Located Connecticut. Box 1154-SS.

MARION MODEL 32—1¼-yd. steam shovel. Boiler inspected February 1, 1938. Machine in good condition. Located Eastern Pennsylvania. Box 2101-SS.

OSGOOD. 1¼-yard gasoline shovel. 1-yard dipper also available. 4-cylinder Leroi gas engine. Only operated three months since $2,000 repairs applied. Excellent condition. Located Texas. Box 2043-SS.

1½-YARD

BUCYRUS-ERIE 37-B Diesel Chain crowd shovel. 1½-yd. 30" cat. treads. Caterpillar D-13,000 6-cylinder 5¾"x8" engine. Wired for lights. Practically new condition. New machine guarantee. Available 30 days. Located Western Pennsylvania. Box 2128-SS

BUCYRUS-ERIE 37-B Gas 1½-yd. shovel. Electric starter and battery lights. Gasoline fuel pump. Wisconsin 6-cylinder 5½"x6½" engine. Machine rebuilt 1933. Good working condition. Located Eastern Pennsylvania. Box 2091-SS.

BUCYRUS-ERIE—42-B STEAM shovel. 1½-yard Vanderhoef quarry dipper. Very good mechanical condition. Can be demonstrated. Located Georgia. Box 1149-SS.

BUCYRUS-ERIE 37-B—1½ yard Chain crowd gas shovel. Wisconsin D-3 engine. Located Minnesota. Box 2075-SS.

OSGOOD—VICTOR—GAS 1½ YD. SHOVEL & Clamshell. Shovel boom 25'. Clamshell boom 50'. Wisconsin D-4—6 cylinder 5¾"x6½" engine. Reported excellent condition. Located Minneapolis. Box 1111-SS.

P&H MODEL 700-B. 1½-yd. Gasoline shovel. Waukesha engine. Good condition. Located Connecticut. Box 2114-SS.

1¾-YARD

One 701 Koehring shovel equipped with a 1¾-yard special rock dipper and D13000 Diesel engine, purchased 1936. Can be seen on the job near Corydon, Indiana. Box 2143-SS.

BUCYRUS-ERIE 43-B Diesel 1¾-yd. Chain crowd shovel. Buda-Lanova 6-cylinder 5¾"x7" engine. Used less than one year. Very good condition. Located Connecticut. Box 2115-SS

BUCYRUS-ERIE 43-B Gas combination shovel and dragline. Shovel dipper 1¾ yd. Dragline boom 60'. 1½-yd. drag bucket. Long axles. 33" treads. Electric starter. Wisconsin 6-cylinder 6"x7" engine. Good operating condition. Located Eastern Pennsylvania. Box 2092-SS.

BUCYRUS-ERIE 43-B late model 1¾-yd. chain crowd shovel. Electric starter. 1½ K.W. Kohler light plant. Buda-Lanova 6-cylinder 5¼"x7" Diesel engine. Located Central New York State. Excellent condition. Box 2019-SS.

5—MARION MODEL 37, 1¾ yard steam shovels, steel cab. Good working condition. Located Minnesota. Box 2153-SS.

2-YARD

MARION MODEL 486—2-yd. Steam shovel. Vertical boiler. Boiler inspected February 1, 1938. Excellent condition. Located Eastern Pennsylvania. Box 2102-SS.

SMALL DRAGLINES
Under 2 Yards

⅜-YARD

BUCYRUS-ERIE 10-B Gasoline Combination Dragline—clamshell—shovel, including drag bucket. Electric starter. Machine shop reconditioned. New machine guarantee. Located vicinity Chicago. Box 2154-SD.

½-YARD

MEAD-MORRISON, ½-yard 35' boom dragline and gas shovel, including ½-yd. Page drag bucket. Good operating condition. Located Minnesota. Box 2081-SD.

UNIVERSAL GASOLINE dragline. ½-yd. capacity. Crawler mounted. Located Indiana. Box 2127-SD

⅝-YARD

BUCYRUS-ERIE 19-B gasoline combination 45' boom dragline, clamshell and ⅝-yard shovel, including ½-yd. AX drag bucket. Hercules engine. Electric starter. Approximately 1 year old. Excellent condition. Located Connecticut. Box 2116-SD

BYERS MODEL 128. ⅝-yd. Gas dragline 35' boom including ½-yd. Page "C" drag bucket. 4-cylinder Diamond T engine. Engine overhauled 1937. Good operating condition. Located Illinois. Box 2087-SD.

¾-YARD

NORTHWEST MODEL 105 GAS—40' boom dragline and clamshell, including Page "C" drag bucket. Climax engine. Reasonably good operating condition. Located Atlanta, Ga. Box 995-SD.

OSGOOD. COMMANDER. Combination dragline, shovel and clamshell. 35' dragline and clamshell boom. ¾-yard Page drag bucket. ¾-yard Rock Type dipper. Hercules 6-cylinder 4⅛"x4½" engine. Completely rebuilt recently and new engine installed. Bucket very good. Will sell on terms. Located Texas. Box 2038-SD.

⅞-YARD

P&H MODEL 206-B combination dragline and clamshell. 40' boom. Waukesha engine. Good condition and appearance. Located Florida. Box 2105-SD.

1-YARD

BUCYRUS-ERIE 30-B Diesel 40' boom dragline. Atlas Diesel 3-cylinder 8½"x10½" engine. $1,500 repairs recently applied. Excellent condition. Located near Chicago. Box 2132-SD

BUCYRUS-ERIE 32-B Gas 50' boom dragline and 1-yd. "U" Drag bucket. Electric starter. Wisconsin engine. Good operating condition. Located Eastern Pennsylvania. Box 2088-SD.

BUCYRUS-ERIE D-2 40' Boom Diesel Dragline. 1½-yd. Light weight drag bucket. Kohler Light plant. Atlas engine. Fairly good operating condition. Located Southeastern Texas. Box 2086-SD.

BUCYRUS-ERIE DA-2 DIESEL-AIR 40' BOOM dragline. No bucket. Atlas Diesel engine. Located Eastern Pennsylvania. Box 872-SD.

BUCYRUS-ERIE — D-2 — DIESEL DRAGLINE. Atlas engine Located Texas. 40' Boom. 1¼ yd. Page Bucket. Field reconditioned. Excellent mechanical and operating condition. Box 1020-SD.

1¼-YARD

BUCYRUS-ERIE E-2 dragline and shovel. 45' boom plus 10' extension. 1¼-yard Page drag bucket. 1½-yard plate dipper. Electric light plant. Atlas Diesel engine. Engine overhauled since last used. Balance of machine good operating condition, except minor repairs needed. Located Louisiana. Box 2053-SD.

BUCYRUS-ERIE 34-B—45' boom dragline. Atlas Diesel 6-cylinder engine. Excellent condition. Located Northern California. Box 2097-SD.

P & H—MODEL 210—55' boom dragline including 1¼-yard Page bucket. Gas powered. Located South Dakota. Box 1172-SD

1¾-YARD

BUCYRUS-ERIE 43-B gas combination dragline and shovel. Dragline boom 60'. 1½-yd. drag bucket. Shovel dipper 1¾ yd. Long axles. 33" treads. Electric starter. Wisconsin 6-cylinder 6"x7" engine. Good operating condition. Located Eastern Pennsylvania. Box 2092-SD.

NORTHWEST MODEL 8 Gasoline dragline. 60' boom. 2-cu. yd. Page bucket. Twin City 7¾"x9" engine. 1500 Watt Kohler light plant. $4,000 repairs and overhauling recently applied. Excellent condition. Located near Memphis, Tenn. Box 2138-SD

2-YARD

BUCYRUS-ERIE 45-B Diesel Dragline. 75' boom. Buda DC-27 6-cylinder 6¼"x8¾" engine. Electric starter. 2¼ yd. Omaha drag bucket. Long cat side frame. Kohler light plant. Good operating condition. Located Nebraska. Box 2111-SD.

2¼-YARD

BIG DRAGLINE BARGAIN
P&H 780, 75 ft. boom, 2¼-yd. bucket, excellent Fairbanks-Morse 8¾x10½ Diesel engine. Available at once. Located in Illinois. Make us an offer.
F. C. MORGAN COMPANY
Underwriters Bldg. Indianapolis, Indiana

SMALL CLAMSHELLS AND CRANES
Under 2 Yards

⅜-YARD

BAY CITY—⅜-YARD GAS CLAMSHELL. Located near Boston. Box 1084-SCC.

BUCYRUS-ERIE 10-B Gasoline Combination Clamshell—dragline—shovel, including drag bucket. Electric starter. Machine shop reconditioned. New machine guarantee. Located vicinity Chicago. Box 2154-SCC.

½-YARD

BUCYRUS-ERIE — TYPE A, ½-yard steam clamshell and shovel. 26' clamshell boom. Cat. mounted. Located Central Illinois. Box 2007-SCC.

FOR SALE

Address all box numbers c/o EXCAVATING engineer . . . . . at South Milwaukee, Wisconsin

⅝-YARD

BROWNHOIST 40' boom steam locomotive crane. Standard gauge car wheel mounting. Fair condition. Located vicinity Chicago. Box 2135-SCC

BUCYRUS-ERIE 19-B gasoline combination 45' clamshell, dragline and ⅝-yard shovel, including ½-yd. AX drag bucket. Hercules engine. Electric starter. Approximately 1 year old. Excellent condition. Located Connecticut. Box 2116-SCC

P & H MODEL 204. 35' boom gasoline clamshell. ⅝-yard Kiesler clamshell bucket. Waukesha engine. New cab. Generally very good condition. Located Chicago. Box 2036-SCC.

¾-YARD

BUCYRUS-ERIE—TYPE B, ¾-yard, 40' boom steam clamshell and shovel. Cat. mounted. Located Buffalo, New York. Box 2005-SCC.

BUCYRUS-ERIE TYPE B, steam, ¾-yard 36' boom clamshell and shovel, including ¾-yard Williams clamshell bucket. Located Central New York. Box 1188-SCC.

NORTHWEST MODEL 105 GAS—40' boom clamshell and dragline, including Page "C" drag bucket. Climax engine. Completely reconditioned. Located Atlanta, Ga. Box 995-SCC.

NORTHWEST MODEL 105, combination clamshell and shovel. 40' clamshell boom. Type "C" Lakewood 1-yard clamshell bucket. 24' shovel boom. 17½' dipper handle. ¾-yard dipper. Twin City gasoline engine. Reasonably good condition. Located near Chicago. Box 2045-SCC.

⅞-YARD

BUCYRUS-ERIE — 1035 ELECTRIC clamshell. 35' boom. ¾ yd. Haiss Coal loading bucket. General Electric motor, 40 H.P. 3 phase. 60 cycle. 220 volt induction motor. Machine in excellent condition. Located New York. Box 1101-SCC.

OSGOOD. COMMANDER. Combination clamshell, dragline and shovel. 35' clamshell and dragline boom. ¾-yard Page drag bucket. ¾-yard Rock Type dipper. Hercules 6-cylinder 4¼"x4½" engine. Completely rebuilt recently and new engine installed. Bucket very good. Will sell on terms. Located Texas. Box 2038-SCC.

P&H MODEL 206-B Combination clamshell and dragline. 40' boom. Waukesha engine. Good condition and appearance. Located Florida. Box 2105-SCC.

1-YARD

AMERICAN "GOPHER" 40' boom clamshell machine. Waukesha 4-cylinder 6"x7" engine. Located near Chicago. Box 2158-SCC.

BROWNHOIST 50' boom steam locomotive crane. Standard gauge car wheel mounted. Overhauled 1937. Located vicinity Chicago. Box 2136-SCC

BUCYRUS-ERIE — GA-2 — GAS-AIR 45' Boom Clamshell Machine. Good Operating Condition. Located St. Paul, Minn. Box 1024-SCC.

BUCYRUS-ERIE — GA-2 GAS AIR Clamshell. 45' boom. Single Shaft Caterpillar. Waukesha 4 cylinder 6¼"x8" engine. Rebuilt since original manufacture. Good operating condition. Located New Jersey. Box 1104-SCC.

NORTHWEST—MODEL 105—gasoline clamshell and shovel—1-yard. Located Massachusetts. Box 1123-SCC.

P&H MODEL 600, 1-yd. gasoline shovel. Crane equipment also available. Waukesha engine. Good condition. Located Connecticut. Box 2113-SCC

P. & H. MODEL 600—40' BOOM GAS clamshell and 1-yard shovel. Waukesha JL-6"x7" Engine. Located North Carolina. Box 1095-SCC.

P&H MODEL 600A 1-yard 40' boom crane and gas shovel. Electric starter and lights. Waukesha 4-cylinder 6"x7" Model J. L. engine. $1500 recently spent overhauling. Good condition and appearance. Located Central Wisconsin. Box 2084-SCC.

1¼-YARD

BUCYRUS-ERIE GA-3 — Gas-Air 1¼-yd. 45' boom clamshell and high lift shovel. Electric starter. Single shaft cat. Waukesha 4-cylinder 6¼"x8" engine. Few minor repairs needed. Otherwise excellent condition. Located New Jersey. Box 2058-SCC.

BUCYRUS-ERIE 41-B Steam Crane. 55' boom. Equipped for pile driving. Oil burner. Boiler flues replaced 1936. Fair condition. Located vicinity Chicago. Box 2089-SCC.

LINK-BELT, MODEL K-2. Gas crane. 50' boom. Also 2 extra 20' inserts to make 90'. Weight 67,000 lbs. Located St. Paul, Minn. Box 2013-SCC.

BROWNING MODEL 25-T Steam locomotive crane—8-wheel truck mounted with outriggers. Capacity 48,000 lbs. at 15' radius. 50' boom. 1¼-yd. Williams clamshell bucket included. Vertical boiler. 125 lbs. working pressure. Inspected November 1937. Approved for use Pennsylvania, New York and New Jersey. Located Eastern Pennsylvania. Box 2112-SCC.

1½-YARD

2—BUCYRUS-ERIE 37-B's Gasoline Special Clamshell Machines. Vertical Tagline. Accelerator control on engine. Special hoist gear and pinion to increase line speed. 30" Cat. treads. Electric starter. 10,000-lb. counterweight. Wisconsin "E" 6-cylinder 6"x7" engine. Good operating condition. Located Boston. Box 2160-SCC.

BUCYRUS-ERIE. 37-B Electric 50' boom clamshell. Long cats. 24" treads. Single motor. 60 H.P. 220 volt, 3 phase, 60 cycle. Good condition. Located New York. Box 2052-SCC.

OSGOOD—VICTOR—GAS 1½ YD. clamshell & shovel. Clamshell boom 50'. Shovel boom 23'. Wisconsin D-4—6 cylinder 5¾"x6½" engine. Reported excellent condition. Located Minneapolis. Box 1111-SCC.

BUCYRUS-MONIGHAN 4-T Diesel Dragline. 150' boom. 1 each 3-cu. yd. and 4-cu. yd. buckets. Fairbanks-Morse 240 HP engine. Located Southern Illinois. Box 2157-LSD.

BUCYRUS-ERIE 320-B. Steam dragline. Truck mounted. 165' boom. One each 6- and 8-cu. yd. drag buckets. Also shovel equipment consisting of 100' boom, 52' dipper handle and two 8-yd. dippers. One dipper new. $10,000 spare parts available. Duty paid in Canada. Located opposite Detroit. Box 2131-LSD

BUCYRUS-ERIE CLASS 24 Steam dragline. 125' boom. Two 3½-cu. yd. Page drag buckets. Skid and roller mounted. $1,000 spare parts available. Duty paid in Canada. Located opposite Detroit. Box 2130-LSD

2—BUCYRUS-ERIE 52-B's Ward Leonard Electric combination shovel and dragline. 30' shovel boom 18' dipper handle 2¼-yd. dipper. 70' boom dragline equipment and 2¼-yd. drag bucket. 3 motors—3 phase 60 cycle 2300 volt. 2 flood lights. Very good condition. Located Eastern Pennsylvania. Box 2094-LSD.

BUCYRUS-ERIE 50-B Diesel Combination shovel and dragline. New 1¾-yd. Esco dipper. 60' dragline boom including 1½-yd. Page drag bucket. Atlas 4-cylinder 9"x12" engine. Good working condition. Located Montana. Box 2107-LSD.

BUCYRUS-ERIE 50-B, 2-yd. steam shovel. Good operating condition. Located Central New York State. Box 2020-LSD.

BUCYRUS-ERIE 100-C. 3-yard steam shovel. Cat. mounted. Fair condition. Located Kansas. Box 2049-LSD.

BUCYRUS-ERIE 95-C. 3-yard steam shovel. Cats. installed 1925. Fair condition. Located Kansas. Box 2050-LSD.

MARION MODEL 60. 2½-yard steam shovel on railroad trucks. Good appearance and condition. Located Kansas. Box 2051-LSD.

CLASS 320 STEAM DRAGLINE, 144-foot boom. 8-yard bucket. Located on Illinois river. A good buy. Box 2155-LSD.

CLASS 230 STEAM DRAGLINE. 175-foot steel and aluminum boom. 6-yard RED ARCH bucket. Ready to work. Located near New Roads, Louisiana. Box 2152-LSD.

70-C BUCYRUS STEAM SHOVEL on Cats. Complete. In operating condition. Shop number 1712. Also one extra three-yard Manganese dipper and sticks. Chicago territory. Box 2164-LSD.

2—BUCYRUS-ERIE 100-B steam shovels, worked only 15 months. Also, 2 Ingersoll-Rand Diesel compressors. Very low prices for immediate sale. H. W. Nelson, 1 Wall St., New York.

P&H MODEL 900, 3½ yard Diesel Shovel, 88-foot boom, 290 h.p. Fairbanks-Morse engine. Mounted on caterpillars. Box 2151-LSD.

BUCYRUS-MONIGHAN 4-W Walking dragline, 80' boom 5½ yard Page bucket, 30' boom insert and 4-yard bucket. Located Tennessee. Box 2150-LSD.

ANY FAIR OFFER ACCEPTED

Class 24 steam dragline. 100 foot boom, 5 cubic yard buckets. Skid and roller mounted. Rebuilt 1927 at a cost of $15,000. New locomotive boiler installed 1928. Will accept any fair offer. Located near Fort Worth, Texas. Box 2149-LSD.

BUCYRUS-MONIGHAN MODEL 6160—Diesel Dragline. 160' boom. 6-yard drag bucket. Fairbanks-Morse Diesel engine. $15,000 extras added since machine was recently purchased. Will rent. Located Montana. Box 2068-LSD.

BUCYRUS-ERIE — TOWER EXCAVATOR. 130' head tower. 50' tail tower. 12-yard bottomless bucket. Electrical equipment 3 phase 60 cycle 4000 volts Ward Leonard. WILL RENT. Located Louisiana. Box 2069-LSD.

BUCYRUS-ERIE — 55-B — DIESEL SHOVEL. 27'6" Boom, 18' Dipper Handle, 2½ yard Dipper. Atlas Diesel Engine. New 1935. Excellent mechanical and operating condition. Located Oregon. Box 1036-LSD.

BUCYRUS-ERIE — 52-B — DIESEL 2¼ yard Shovel and Dragline. Atlas engine. Good condition. Located Eastern Pa. Box 1039-LSD.

BUCYRUS-ERIE — 100-B — STEAM SHOVEL. 3 yard Dipper. Revolving machinery, very good condition. Located Montreal, Canada. Box 1041-LSD.

BUCYRUS-MONIGHAN—MODEL 4-T — 4-yard Diesel Dragline. 110' Boom. Good Condition. Located Nebraska. Box 1047-LSD.

BUCYRUS-ERIE 50-B Diesel Dragline. 50' boom. 2-yard Page "M" drag bucket. Kohler Light Plant. Atlas Engine. Overhauled completely 1937. Actually used only 4 years. Good condition. Located Illinois. Box 2083-LSD.

BUCYRUS-ERIE 175-B 2 Motor AC Electric Dragline. Truck Mounted. 125' boom. 1 each 4-, 5-, and 6-yd. drag buckets. Chain drive from main motor to intermediate shaft. Extra rotors for main and swing motors and other spare parts. 3—75 KVA 60 cycle 2200/220/440 volt transformer mounted on machine. Power supply 3 phase 60 cycle 440 volt. Completely overhauled since received from factory. First class operating condition. Located Kansas. Box 2082-LSD.

BUCYRUS-ERIE 5-W Diesel Dragline. 90' Boom. Electric swing. Vortex Air Oil Cleaners. Electric fan in operators platform. 5-yd. "Y" drag bucket. Fairbanks Morse 250 HP Type 33-D 5-cylinder 10"x10½" pump scavenging engine. Auxiliary Waukesha gas engine. Good working condition. Located Colorado River Aqueduct near Indio, Cal. Available March 15. Box 2079-LSD.

BUCYRUS-MONIGHAN 5-W Diesel Dragline. 80' Boom. Electric swing. Vortex Air Oil Cleaners. Electric fan in operator's platform. 6-yd. "Y" drag bucket. Fairbanks Morse 250 HP Type 33-D 5-cylinder 10"x10½" pump scavenging engine. Auxiliary Waukesha gas engine. Good working condition. Located Colorado River Aqueduct near Indio, Cal. Available March 15. Box 2080-LSD.

MARION—MODEL 350—3 yard Electric Shovel. Power equipment, 3 Phase, 60 cycle, 2300 volt — Ward-Leonard Control. Mounted on railway trucks. Good condition. Located Minnesota. Box 1049-LSD.

MARION—MODEL 70—3½ yard Electric Shovel. Railway truck mounted. Power Equipment. 3 Phase, 60 cycle, 2300 volt. Good condition. Located Ohio. Box 1050-LSD.

FOR SALE

Address all box numbers c/o EXCAVATING engineer . . . . . at South Milwaukee, Wisconsin

LARGE SHOVELS AND DRAGLINES
2 Yards and Over continued

PAGE—MODEL 220—2½ yard Diesel Dragline. 85' Boom. Good operating condition. Located Iowa. Now operating. Box 1052-LSD.

BUCYRUS-MONIGHAN 3-T DIESEL dragline. 80-ft. steel boom, 8 cu. yd. drag bucket, 120 h.p. Fairbanks-Morse type "YVA" engine. 1500 watt Kohler light Plant. Working at Little Rock, Ark. Box 1056-LSD.

BUCYRUS-ERIE — 75-B Electric Combination Shovel and Dragline. 29-ft. shovel boom, 20-ft. dipper handle, 2½-yard dipper, 85-ft. dragline boom with mast suspension. Suitable for power supply, 3 phase, 60 cycle, 2300 volt. Induction motors. Said to be in excellent working condition. Located Eastern Pennsylvania. Box 1058-LSD.

BUCYRUS-ERIE 50-B — 2-yard Steam Shovel. Located Texas. Low Price. Box 1059-LSD

BUCYRUS-ERIE 55-B—Extra High Lift Diesel Shovel. 35-ft. boom, 22-ft. dipper handle, 2 cu. yd. Bowl Door dipper. Caterpillar mounted. Kohler light plant. Atlas Diesel engine. Used about three months. Just like new. Located Eastern Pennsylvania. Box 1069-LSD.

PAGE — MODEL 220 — Electric dragline. 90' boom, 3½-yard Page R.C. drag bucket. Box 1124-LSD.

BUCYRUS-ERIE—CLASS 24 DIESEL dragline. 130-ft. boom, 4 cu. yd. bucket. Truck mounted. 165 h.p. Anderson Diesel engine. Friction drive. Said to be in good operating condition. Located on Mississippi River near New Orleans convenient for loading on barge. Box 1074-LSD.

LOCOMOTIVES

STANDARD GAUGE LOCOMOTIVES BARGAINS

1—Baldwin 45-ton 17x24
2—Baldwin 77-ton 19x26
9—Baldwin 51-ton 17x24
4—American 60-ton 20x26
Located in Minnesota.
Box 2147-ME.

MISCELLANEOUS EQUIPMENT

1 HOLT MODEL 50 Gas Tractor. Located Illinois. Box 2159-ME.

1—20-TON all steel Guy derrick, 80' mast. 75' boom complete with 6 Guy cables approximately 250' long. Includes Dake steam engine driven winch bolted on side of mast complete with load and cables. Also electric motor in addition to Dake engine. Hand swing. Also included one Westinghouse cross-compound steam driven air compressor. Approximate weight 20,000 lbs. Located Wisconsin. Box 2156-ME.

8-inch Bennett Suction Pump; 8-inch pipe; Pontoons. 55 foot conveyor; 24-inch belt. Above all in good condition. Fred C. Hamilton, 814 Volkmann Bldg., Kankakee, Illinois.

LOCOMOTIVE CRANES

4—Standard gauge locomotive cranes, three —20-ton, one—10-ton. Offered at bargain prices. Located Minnesota.
Box 2146-MF.

BROWNHOIST Steam Locomotive crane. 44' boom. 8-wheel standard gauge MCD coupling. Lifting capacity 20,000 lbs. at 20' radius. One each 1-yd. and 2-cu. yd. clamshell buckets available. Located Wisconsin. Very good condition. Box 2137-ME

PLACER MINING EQUIPMENT, consisting of complete washing plant with trommel screen, pumps, stacker, etc. and a Speeder ½-yd. 42' boom Diesel dragline including ½-yd. drag bucket. Excellent condition. Located Wyoming. Box 2134-ME

FOR SALE CHEAP

2½-ton Steam Roller
8-ton Gas Roller
Fordson Tractor Roller
Box 2139-ME

BABY MACK—DUMP TRUCK. 4-yard Heil Dump body and 3-ton wood coal body. Hi-Lift Heil Hoist. Pneumatic tires all around. Good condition. Located New York. Box 2048-ME.

BARGAIN PRICES

2—14 Cu. Yd. LaPlante-Choate Wagons
2—75 Caterpillar-Diesel Tractors
(Above equipment like new)
1—Model 71 Keystone Well Drill
1—2¼ Cu. Yd. Page Dragline bucket, A-1 condition
1—1½ Cu. Yd. Page Dragline bucket, A-1 condition
Box 2140-MF.

NEW ELECTRIC MOTORS AND ACCESSORIES BARGAIN PRICES

A large variety of power sizes and power characteristics; also switches, controls, etc. Write us your requirements.
Box 2100-ME.

FRUEHOFF SEMI-TRAILER with 8' by 40' Deck. (Can be shortened.) Single rear axle with 4 wheels each with 36"x10" solid rubber tires. Air Brakes. 16 ton capacity. Excellent condition. Located New York. Box 1160-ME.

DRAG BUCKET

BUCYRUS-ERIE 1½-YARD Type "Y" Drag Bucket. Good condition. Located Kansas. Box 1166-ME.

DRAGLINE EQUIPMENT

72-ft. Dragline Boom and Fairlead—Hydraulic Equipment—1 Hoist Drum—1 Drag Drum—1 Boom Suspension, Sway Brace and Suspension Cables. All suitable for application to Bucyrus-Erie Model 75-B Machine. Located Eastern Pennsylvania. Box 1060-ME.

BARGAIN—NEW DIESEL COMPRESSOR ATLAS DIESEL POWERED portable air compressor, 4 cylinder, 60 H.P. engine of dustproof type, skid mounted, self contained, complete with radiator cooling system. Direct connected to a 320 cubic feet Worthington Feather Valve Compressor. Brand new and a bargain to the first comer. Atlas Imperial Diesel Engine Company, Oakland, Calif.

HAISS EXCAVATOR — C7097, June 1930. Weight 11 tons. Needs new teeth. 33" per minute crowding. Price $1800. Box 990-ME.

CAR TRANSPORTER

CAR-TRANSPORTER or stacker with reach of 135' and dumping height of 75'. Equipped with 4-yard aluminum car. Caterpillar-mounted and suitable for use with shovel having per hour output of 250 yards. Electric drive, 3-phase, 60-cycle, 4000-volt current. This car transporter is in excellent condition and priced to sell. Located near Kansas City, Missouri. Box 2010-ME.

SHOVEL EQUIPMENT—Late design—suitable for Bucyrus-Erie 52-B Diesel. Only handled about 4,000 yards material. Equipment located Alabama. Box 1113-ME

FRONT FOR 32 MARION

1½ CU. YD. shovel front end—new dipper—for Marion 32 steamer. Priced right. Located near Chicago. Box 2165-ME.

INDUSTRIAL STEAM WRECKING DERRICK. Non-propel. Rating 50 tons at 20' with outriggers. Located Nebraska. Box 1171-ME

BARBER-GREENE—MODEL B-44 ditcher. Located North Carolina. Box 1180-ME

KOEHRING DRAG SHOVEL equipment for Model 301 machine. Used very little. Low price. Located Eastern New York State. Box 1181-ME

USED CONTRACTORS EQUIPMENT

1—Model 100 Lincoln Revolver with 100' boom and 12' Gantry.
2—275 Koehring Mixers with Electric motors.
1—200-ton Blaw-Knox Bin with weighing batchers, cement scale and push button control.
1—Robinson Pneumatic cement unloader with silo.
1—20-ton Whitcomb Gasoline Dinkey, overhauled.
4—18-ton Steam Dinkeys, overhauled.
12—30-yd. Western Lift Door Air Dump cars.
4—30-yd. Koppel Drop Door Air Dump cars.
26—16-yd. K. & J. Lift Door Air Dump cars.
6—20-yd. K. & J. Lift Door Air Dump cars.
5—2-cu. yd. Blaw-Knox Roller gate Concrete Buckets.
7—70-ton 20x36 Baldwin Switchers.
3—Jordan spreaders excellent condition.
Located Mississippi valley. Box 2011-ME.

DRAG SHOVEL EQUIPMENT—consisting of 18' boom, 7'6" dipper handle and ½-yd. front-opening dipper suitable for application to Bucyrus-Erie 1020 shovel. Located Rhode Island. Box 2003-ME.

EUCLID-TUWAY 11-CU. YD. dump wagon. Hydraulic hoist. Worked only 320 hours. Located Central New York State. Box 1189-ME.

ERIE AGGREMETER BIN—80-ton capacity with 3 compartments, including weighing scales. Only handled 10,000 tons. Located Central New York State. Box 1190-ME.

SURPLUS MINE EQUIPMENT BARGAIN PRICES

Write for prices of this equipment. Save money. Located in Minnesota.
5—Boilers, locomotive and horizontal return tube types, 150 H.P.
14—Flat cars, 36" gauge, 18-ton.
3—Crushers, jaw, 44x28, 36x24 and Universal.
1—Motor, 135 H.P. squirrel cage, 1150 r.p.m., 220 v., 3 ph., 60 cy., A. C.; compensator.
3—Rotary converters, 300 Kw., HCC-6-300-1200, Forms P, D, & V, 6 and 3 phase.
1—Switchgear for 3-phase rotary converter, complete, semi-automatic.
3—Transformers, 300 Kw., 66,000 V. Primary, reconnected for 22,000 V. Primary.
1—Ainley placer gold machine, complete. 4-bowl with feed hopper for dragline operation. 40-50 tons per hour.
3—Hoists, double and single drum.
1—Bucket loader.
8—Pumps, steam (1 gas engine driven) from 49 to 3700 g.p.m.
1—Tractor, Twin City No. 12-20.
1—Water softener, 5 ft., complete.
120—Batch boxes, oak, 55 cu. ft.
2—Drums mine hoist, dia. 50", width 40", flange 7", capacity 400' one-inch rope.
Box 2145-ME.

BLAST-HOLE DRILLS

14—Sanderson-Cyclone Model 14, non-traction—six Model 14-SR, traction type, electric blast-hole drills. Also six Loomis Clippers—Models 4 and 44, steam traction. All in good condition, available for immediate shipment. Located New York. Priced to sell. Box 2167-ME

WANTED

WANTED

One standard ⅝-yard full swing combination shovel and dragline—Diesel powered, complete with dragline boom, fairlead, bucket and all accessories. Write 401-454 Montgomery St., San Francisco, Cal.

WANTED

Full revolving steam shovel, 2½ or 3-yard capacity. Box 2144-ME.

WANTED

Used concrete pipe forms, a few sizes from 8" up. Prefer the slip-joint ends. Box 2163-ME.

WANTED TO BUY

NORTHWEST MODEL 105 or 104, with late style cats and Twin City engine. State lowest price in first letter and where machine can be inspected. Box 2166-ME.